Vol. XVII
No. 8

INDUSTRIAL-ARTS MAGAZINE

August,
1928

Incorporating: HANDICRAFT and the ARTS AND CRAFTS MAGAZINE

Published Monthly by

THE BRUCE PUBLISHING CO.

354-364 MILWAUKEE STREET
MILWAUKEE, WIS.

Eastern Office:
50 CHURCH STREET
NEW YORK, N. Y.

Western Office:
53 W. JACKSON BLVD.
CHICAGO, ILL.

TABLE OF CONTENTS

Intelligence and Shop Accidents 265
Max S. Henig
The Organization of Elementary Sheet-Metal Classes 266
J. A. Brandt
Illustrative Material for Patternmaking Classes 268
C. S. Hentzell
Counseling 271
Bertha M. Monroe
Correlating Guidance with Practical Arts in the Continuation School 273
Robert Walker
The Vocational Teacher and His Blackboard 274
Wm. A. De Vette
EDITORIALS: Abolishing the Industrial Arts—Look Ahead—Courtesy to the Speaker—Squelching Ambition—Our Greatest Problem 276
Successful Organization Schemes 278
Edward N. Wallen
Coverall Club as a Preventive Agency 278
Arnold F. Tuttle
Take Pen in Hand 279
Laurence Parker

SUPPLEMENTS

Chart of Typical Building Constructions ..... No. 102
John F. Faber and Fay Daley
Architectural Lettering Chart ..... No. 103
J. I. Sowers

PROBLEMS AND PROJECTS

A School Table 280
Fred Thompson
Improved Type Stand 280
Dean W. Conner and John F. Faber
Caring for Brushes 280
G. E. Berger
An Easel for the Artroom 281
William L. Hunter
A New Lamp-Bank Circuit 281
A. K. Thompson
General Shop Power Bench 282
S. L. Coover
Library Truck 285
Harry Cameron
Bending Tubing 285
C. C. Hermann
Grinding Jig 286
Jos. J. Lukowitz
A Folding Belt Stick 287
W. Kendall
Shop-Made Marking Stamps 287
Howard W. Boekeloo
A Greasing Rack 287
N. D. Stutzman
The Belt Sander 288
Leon A. Orr
A Shop-Made Emery-Wheel Dresser 288
S. S. Sutherland
A Stand for Projection Problems 289
Wilfrid Bowdler
Replacing Bench Knives 289
Russell E. Norris
Drying Racks for the Printshop 289
W. W. White
Container for Triangles, Pencils, and Erasers 290
Ralph P. Hummel
Jumping Stand 290
R. B. Farr
Sand-Drum Planer 292
Walter D. Emerson
A Compact Tool Cabinet 292
Gordon H. Higgins
Architectural Drawing Checking List 292
L. N. Cilley
Woodshop Drawing Seat 293
L. W. Kunkle
Paste-Spreading Tool 293
Frank Bentley
Arrowhead on Ruling Pens 293
George E. Myers
The Daily Grade Card 293
W. R. Tucker
Flood Lights for the School Stage 294
Wm. A. De Vette
Drawing-Board Support 295
John J. Metz
An Adjustable Curve 295
M. W. Shillinger
Racks for Reed and Raffia 295
Bertha Thompson
A Chart of Typical Building Constructions. 295
John F. Faber and Fay Daley
Screw Box 296
Fred Short
Drawing Table 296
R. A. Armstrong
Apparatus for Demonstrating the Laws of Bending 298
Leon A. Orr
A Tool Cupboard or Toolroom 298
J. D. Wilson
Pupil-Progress Chart 298
Riley S. Williamson

New Books 300
Personal News Notes 301
Now, Are There Any Questions? 302
Publications Received 22a
News and Notes 24a
School Shop Equipment News 31a

SCHOOL UTILITIES

It frequently happens that a teacher senses the need of something that will help him to do his teaching job a little better. He puts his ingenuity to work and "presto" he has produced something worth while.

If this teacher is public spirited, he disseminates his idea to help his fellow teachers.

In this issue, 37 of these homemade utilities are shown.

Will you not reciprocate and contribute ideas of your own? It takes united effort to make a profession grow.

(The articles contained in the Magazine are regularly indexed in "The Reader's Guide to Periodical Literature," the "Loyola Educational Index," and "Current Magazine Contents.")

Entered Jan. 2, 1914, as second-class mail matter at Milwaukee, Wis., under Act of March 3, 1879. Copyright, 1928, by Bruce Publishing Co. Title registered as Trade Mark in U. S. Patent Office, Jan. 16, 1917. Member Associated Business Paper and Audit Bureau of Circulation.

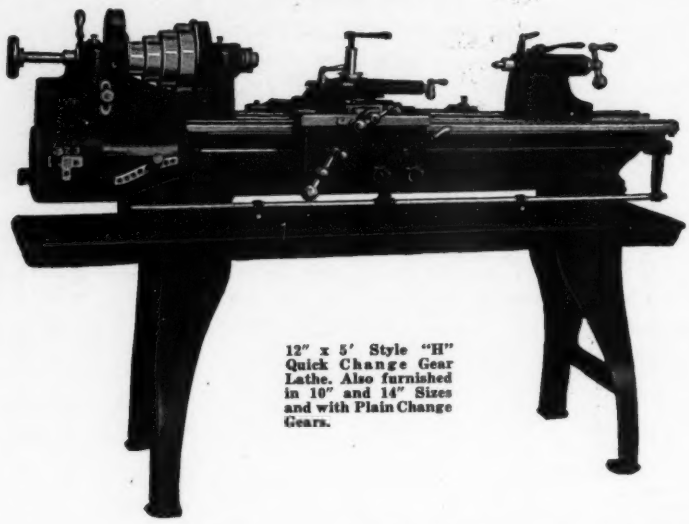
Subscription Information—Subscription price, $2.50 per year, payable in advance. Canadian and Mexican postage, 35 cents, foreign countries, 50 cents. Copies not over three months old, 25 cents; more than three months, 50 cents. Notices for discontinuance of subscription must reach Publication Office in Milwaukee, at least fifteen days before date of expiration. Changes of address should invariably include old as well as new address. Complaint of non-receipt of subscribers' copies cannot be honored unless made within fifteen days after date of issue.

Editorial Contributions—The Editors invite contributions bearing upon Industrial-Arts Education, Manual Training, and related subjects. Manuscripts, drawings, projects, news, etc., should be sent to the Publication Office in Milwaukee. Contributions are paid for at regular space rates. In all cases manuscripts should be accompanied by full return postage.

The Magazine is on sale at Brentano's, New York; Wanamaker's, Philadelphia; Brentano's, Chicago.

School Lathes That Promote

Quality — Efficiency — Accuracy



12" x 5' Style "H" Quick Change Gear Lathe. Also furnished in 10" and 14" Sizes and with Plain Change Gears.

You're Right—STAR LATHES

A skilled mechanic is always a welcome addition to any shop. A boy's early training can do much toward making him a skilled mechanic. Give your boys only the finest machines—STAR LATHES—to help them develop. They will appreciate your interest and show their appreciation by becoming better students. Thus your work will consequently be lightened and it will be more of a pleasure to teach your boys when you know they are desirous of learning.

We have been building Star Lathes for over forty years. Throughout their many years in the school shops they have always given satisfactory service. Instructors say that students working on Star Lathes become more efficient mechanics and turn out work that is very accurate and has a distinctive quality about it. You, too, will say the same thing once you have installed Star Lathes in your school shop. For Star Lathes have these characteristics built in.

See our SPECIFICATIONS in BRUCE'S SPECIFICATION ANNUAL of INDUSTRIAL ARTS & VOCATIONAL EDUCATION EDITION

STAR LATHES

Write for fully illustrated Descriptive Catalog. Or better send us a layout of your school shop and we will help you specify.

SENECA FALLS MACHINE COMPANY

SENECA FALLS, N. Y.

THE INDUSTRIAL ARTS MAGAZINE

Volume XVII AUGUST, 1928 No. 8

INTELLIGENCE AND SHOP ACCIDENTS

Max S. Henig, Newark, N. J.

THIS STUDY of the relationship between intelligence and liability to accident was carried on among the apprentices of the West Orange and Irvington units of the Essex county (New Jersey) vocational schools. Its purpose was to discover, by means of a suitably scientific procedure, something authentic concerning the mental causes of accidents.

The investigation was carried on for a period of several years and was made by checking each apprentice's accident record against his intelligence score as shown by the U. S. Army alpha test. Using the school's specially formulated definition of a reportable accident; namely, that every mishap which results in an injury that requires treatment or presents possibility of infection is a reportable accident, data were obtained about 343 apprentices. Table I summarizes the findings for all these boys, their length of stay in school and consequently their term of exposure to accident being disregarded.

TABLE I. Relation between General Intelligence and Proneness to Accident
Term of Exposure Disregarded

Intelligence Class	Significance	Frequency	Number Injured	Per Cent
A	Very Superior	18	7	38.9
B	Superior	62	16	25.8
C+	High Average	129	55	42.6
C	Average	103	51	49.5
C—	Low Average	30	14	46.6
D	Inferior	1	1	100.0
	TOTALS	343	144	

The number of cases in the two extreme levels, eighteen of very superior intelligence, one of inferior intelligence, are too few to be considered in drawing conclusions. The rest of the table shows for each descending grade except the low average, a decided increase in the ratio of those injured to the number in each level. Since it may be taken for granted that the more intelligent apprentices were assigned a proportionately larger number of jobs and consequently had a more frequent exposure to accident, it is increasingly evident that the lower an apprentice's level of intelligence, the greater his likelihood to meet accidental injury.

The validity of this conclusion is emphasized by Table II which presents the same data for a group of 135 apprentices, all of whom were exposed to the hazards of their trades for a full twenty-month period.

TABLE II. Relation between General Intelligence and Accident Proneness
Term of Exposure—Twenty Months

Intelligence Class	Interpretation	Frequency	Number Injured	Per Cent
A	Very Superior	12	5	41.7
B	Superior	26	8	30.7
C+	High Average	50	25	50.0
C	Average	40	24	60.0
C—	Low Average	7	7	100.0
	TOTALS	135	69	51.1

A further analysis of this data resulted in a most interesting revelation concerning those apprentices who had been injured two or more times. These are the repeaters. Table III presents the number of these accident repeaters in each intelligence level, Column 4 shows the ratio which the number of those who repeat bears to the total number of apprentices injured. Column 5 shows the ratio between this number and the frequency in each intelligence class.

TABLE III. Relation between Intelligence and Accident Proneness of Repeaters

Intelligence Class	Frequency	Injured	Repeaters	Column 3 divided by column 2	Column 3 divided by column 1
	1	2	3	4	5
A	18	7	3	42.9	16.7
B	62	16	7	43.7	11.3
C+	129	55	24	43.6	18.6
C	103	51	20	39.2	19.4
C—	30	14	8	57.1	26.7
D	1	1	1	100.0	100.0
TOTALS	343	144	63	43.7	18.3

This table discloses two important facts. The one is that with these repeaters, as with the entire group that met with mishaps, the lower the intelligence level, the greater the likelihood of accident. The figures which appear in column 5, give for each intelligence class, the ratio the number of repeaters bears to the total frequency. The other fact, made evident by column 4, which gives the ratio of the number of repeaters in each class to the total number injured, is that some other factor besides intelligence is operative in producing the repeater. This conclusion is based on the data that show in all intelligence levels, that the ratio of repeaters to the number injured in each respective class, is about the same. As is further borne out by Table IV, which gives the data for a group whose time exposure to the hazards of the job was practically the same, about 45 per cent of the apprentices who met with an accidental injury shortly after they enrolled, repeated that experience in spite of safeguards, instruction and supervision, all of them components of a particularly rich safety program.

TABLE IV. Relationship between Intelligence and Accident Proneness of Repeaters
Term of Exposure to Shop Conditions—Twenty Months

Intelligence Class	Frequency	Injured	Repeaters	Column 3 divided by column 2	Column 3 divided by column 1
	1	2	3	4	5
A	12	5	2	40.0	16.7
B	26	8	4	50.0	15.4
C+	50	25	11	44.0	22.0
C	40	24	11	45.8	27.5
C—	7	7	5	71.4	71.4
TOTALS	135	69	33	47.8	24.4

Figures 1 and 2 further analyze the above data.

From the foregoing data, it would appear that the industrial safety problem, and that presumes the safety problem of

the vocational industrial school, is in the final analysis a highly particularized problem, epitomized by those conditions, whatever they may be, that produce the repeater. A sidelight on the great extent to which this is true is given by the figures which show that these repeaters were responsible for 97 accidents over the period studied. That is, 67 per cent of the

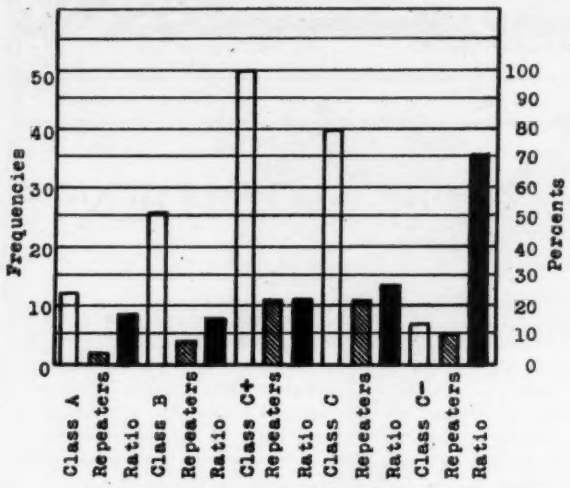


FIG. 1. RATIOS IN PER CENTS OF REPEATERS TO TOTAL NUMBER IN EACH INTELLIGENCE CLASS. TERM OF EXPOSURE—20 MONTHS.

total mishaps recorded. In other words, 24.4 per cent of the apprentices enrolled in the schools accounted for 67 per cent of the total accident frequency.

It would appear from these findings, that no safety program may be considered complete unless it includes the testing for general intelligence of those exposed to accident. The results of these tests and an explanation of their significance in the light of the above findings should then be placed in the hands of the person responsible for the institution's safety activities. This procedure, coupled with special instruction and

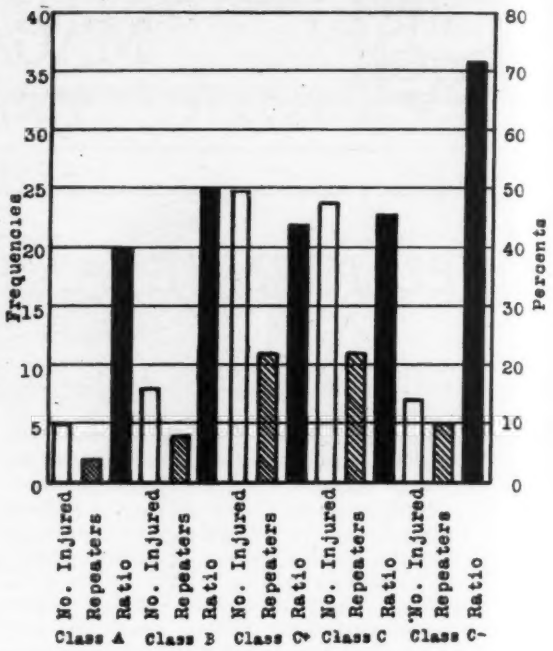


FIG. 2. RATIOS IN PER CENTS OF REPEATERS TO TOTAL INJURED IN EACH INTELLIGENCE CLASS. TERM OF EXPOSURE—20 MONTHS.

supervision of those workers in the more susceptible intelligence levels, would undoubtedly result in a substantial reduction in the occurrence of accidents.

THE ORGANIZATION OF ELEMENTARY SHEET-METAL CLASSES

J. A. Brandt, Mooseheart Vocational School, Mooseheart, Illinois

SO MANY SATISFACTORY PROJECTS are available for elementary sheet-metal work that the selection of the projects described in detail in this article requires justification. An explanation of the methods used and the aim of all prevocational work given in the Mooseheart shops will therefore be helpful.

Mooseheart is the home and school conducted by the Loyal Order of Moose for dependent children of its deceased members. It is the aim to graduate each of these students with a high-school education and a trade. Many of these students of a necessity, must be self-supporting on graduation; consequently, every effort is made to intensify all prevocational and trade training.

Mooseheart uses the "shift" method of applying vocational guidance. For example: As soon as a student reaches the seventh grade in the academic school he is classified as a prevocational student, and, with a group of seventh-grade students is assigned to one of the vocational shops for trade tryout work. The assignment to each shop, is made for a period of three months, two hours per day, five days per week. During the term in any particular shop every effort is made to give each individual student as many trade contacts, and as much of the applied technical information relating to the trade as time and the student's ability to assimilate such instruction will permit.

All prevocational classes are conducted in the regular vocational shops in the morning, trade classes being conducted in the same shops in the afternoon from one to four. At the end of three months, this group is reassigned to another department, and this is done every three months until the students have had what might be called a "taste" of the work in every vocational department included in the Mooseheart curriculum. As soon as they become high-school students, they make a selection of the trade they desire to learn.

Throughout the entire period of prevocational work, records are compiled of the individual student's effort and adaptability in the various trades, and these records are used by a counselor in aiding the student to determine the trade he desires or is best fitted to learn.

While the method described cannot be used in many schools, the work of the *general shop* can be so arranged that the same results can be secured on a smaller scale. That this method of applying vocational guidance is efficient has been demonstrated by the fact that only a small number of students

request a change of assignment after a selection has once been made. The method is exceptionally flexible in its general application to all special cases that are commonly encountered.

We frequently encounter a prevocational student who shows exceptional fitness for a certain trade, and who expresses a positive desire to learn this trade. If this student's academic and prevocational records are satisfactory, he is classified as a vocational student and given a permanent assignment to the trade which he has selected, even though he has not reached high school, his vocational training is then continued throughout the prevocational period.

There are also students, who for various reasons, cannot carry on regular academic studies. These students are permanently assigned as *special vocationals,* to a trade, and then continue as all-day students, devoting all of their time to shopwork, with the exception of certain periods in which they take up related academic and correlated subjects.

Prevocational students are not given pattern drafting except in special cases where the student is exceptionally proficient. Metal patterns are supplied for all projects where necessary.

It has been our experience in this shop that too much care and thought cannot be devoted to the selection of the projects to be used in the training of these elementary students, especially when this work is to be used as a basis for vocational guidance.

It has also been demonstrated that it is inadvisable to overload these students with advanced technical information, or to permit them to undertake tool and machine operations of the more difficult type. A failure at this time tends to defeat the purpose for which the work is given. The technical information that of necessity must be presented at this time, along with the requirement that these students develop a certain degree of skill in the use of common tools and machines, will more than supply all the work that they can be expected to assimilate.

basis on which to grade and compare students' work.

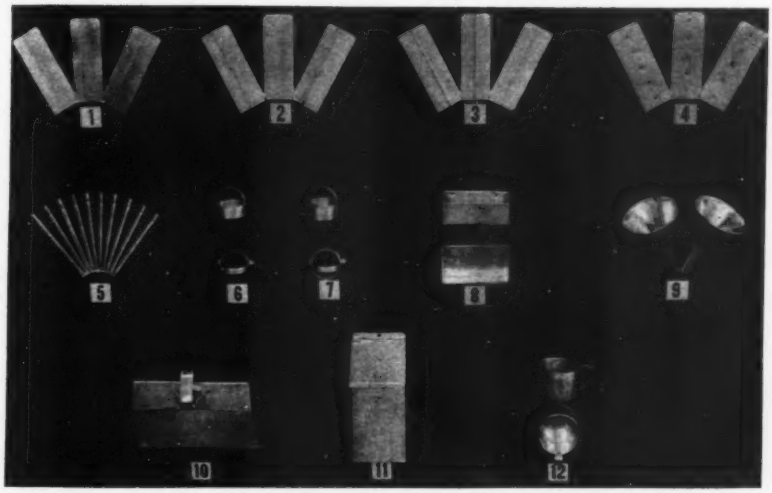
Teaching elementary students the proper care and use of soldering coppers, is undoubtedly one of the most difficult jobs found in the elementary course. The order of its presentation in the course is therefore made an exception to the general rule, because it has been found far more satisfactory and economical to require the student to develop a certain degree of skill in soldering before undertaking the construction of "formed up" work.

Each student is therefore required to do some practice soldering on scrap metal, the work required being assigned as a project and used as will be explained later. The projects that will be shown and described cannot be considered a complete course. They are considered as basic projects on which to base the necessary instructions that must be given covering both technical information and the use of the tools and machines.

To carry the interest of the students, they are permitted to construct various projects of their own selection between regular project assignments. Considerable care should be used to see that these special problems do not involve the use of machines for which students have not received instructions. For example: Practically every student will request permission to construct some kind of box with a hinged lid. Permission for constructing the problem is withheld until dustpans have been made, at which time the student will have used all tools and machines necessary in the construction of the box.

Short talks on the following subjects relating to the sheet-metal trade are given at various times throughout the course:

a) The future of the trade.
b) Wages and hours.
c) Health conditions.
d) The kind of boy that will succeed.
e) Chance for advancement; salesman estimator; pattern draftsman; contractor or shop owner.
f) Kind of work done by the sheet-metal worker (general).
g) Trade and technical knowledge required.
h) Opportunities for employment in any locality.



PROBLEMS FOR THE ELEMENTARY SHEET-METAL CLASS.

The technical information is presented in a series of short talks followed by class and individual demonstrations. There is one general rule governing the selection of projects for this work. All projects must be so selected and arranged in the course that the work advances from the most elementary to the more difficult. The problems chosen, also should require a certain amount of repetition of work previously done.

A standardized basic course is a necessity, since the instructor must compile considerable technical information which can best be presented when based on a standard series of projects. These standard projects will also furnish a better

i) Undesirable conditions affecting the trade.

Briefly stated, the object of the prevocational sheet-metal work in the Mooseheart shop is as follows:

1. To give the student a general idea of the type of work done by the sheet-metal worker and an opportunity to determine whether or not the work is of a nature appealing to his mechanical abilities.

2. To teach him, in a general way, the elementary work of the trade and to familiarize him with the common materials used by the sheet-metal worker so that he may have some idea of the work even though he does not desire to learn the trade.

3. To act as a basis on which the counselor can best apply vocational guidance.

In selecting the twelve projects shown by the illustration, considerable thought has been given to keeping costs for materials as low as possible. The number of each project to be made by each student can be determined only by the individual instructor. In making individual demonstrations, it is frequently necessary that the instructor should do part of the work on the project. When this condition is encountered, the student is required to construct the project again without assistance, even though the first attempt proved passable.

ILLUSTRATIVE MATERIAL FOR PATTERNMAKING CLASSES

C. S. Hentzell, Milwaukee Vocational School, Milwaukee, Wisconsin

ALL TRADE CLASSES require the use of some form of illustrative material in order to clear up difficult points. This is doubly important in the patternmaking classes where it is necessary to foresee molding and construction problems directly from the blue print. The imagination must necessarily play a most important part in the patternmaker's work, and it should be given every possible assistance. Any material which will serve to bring out points which are hard for the imagination to picture, is valuable to the future patternmaker.

The illustrative material outlined herewith has been used by the writer and found to be very satisfactory. The material has been divided into two main groups: "Molding Problems" and "Construction Problems." Under "molding problems" are included the major points which are vital to an understanding of the use of the patterns and core boxes in the foundry. Under "Construction Problems" are included the various principles of construction used in the patternmaker's trade.

In assembling this illustrative material the writer has tried to keep in mind two important requirements: First, the illustrative material must be so arranged that it not only serves for demonstration purposes, but that it can also be used by the boy in solving his individual difficulties. Second, the information given by the illustrative material must cover the usual pitfalls encountered by the young patternmaker. The points which are emphasized by the display boards illustrated herewith, have not been arbitrarily chosen from the many possible problems in the trade. They represent instead, the actual difficulties met by the boys who are pursuing the study of patternmaking at school. In order to determine the points that needed special treatment, the individual errors and misunderstandings of the students were carefully noted over a long period of time. It was assumed, that the errors which are common to a group of individuals are the points which should be cleared up through the use of illustrative material. The importance of emphasizing these points was further established through personal interviews between the writer and pattern-shop foremen and checkers in the manufacturing plants in the city. It was somewhat surprising to find that the weak points in the boys' work were almost identical with those commonly observed among journeymen patternmakers. The so-called "bulls" made occasionally by journeymen on complicated jobs are usually a repetition of the boys' mistakes on the simple ones. From this list of common errors and misunderstandings, the materials for illustrative purposes have been selected. It is not the intention of the writer to even insinuate that errors in the trade will be completely stamped out through the use of special illustrative material. Such material will, however materially reduce the misunderstandings which are conducive to these common trade difficulties.

For the convenience of the readers who may wish to try out part or all of the suggestions outlined, the discussion will be divided into the two headings previously mentioned; namely, "Molding Problems" and "Construction Problems." It is understood, however, that these two groups of problems will be interwoven in any patternmaking course. The construction features will probably increase in difficulty as the molding problems advance.

Molding Problems

A series of boards or panels 20 by 26 in. upon which small frames or cases are fastened, are used to present the various steps in the molding processes. The panels are provided with two screw eyes in the top for hanging on corresponding hooks in the upper blackboard railing or any other suitable place. The cases or frames which are fastened to the panels contain representations of the various steps in molding. A small glass-covered frame containing a printed explanation of the meaning of the model, is fastened to the panel directly below the cases in which the models are placed.

The panels are designed to be used in groups or sets. The first group consists of six panels showing the major steps in the molding of a simple pattern. An examination of the illustrations, reveals the method of showing this information. In Figure 1, a strip of wood ¾ in. thick fitting the inside of the case is placed upon two blocks giving it the appearance of the molding board or bottom board. The pattern is laid cope side down, upon this molding board. A glass cover is placed over the case to protect the model from dust or damage.

The second panel, Figure 2, shows the pattern in the drag after the drag has been rammed up and turned over. The molding board is on top of the drag, while the bottom board is shown in its position beneath the mold.

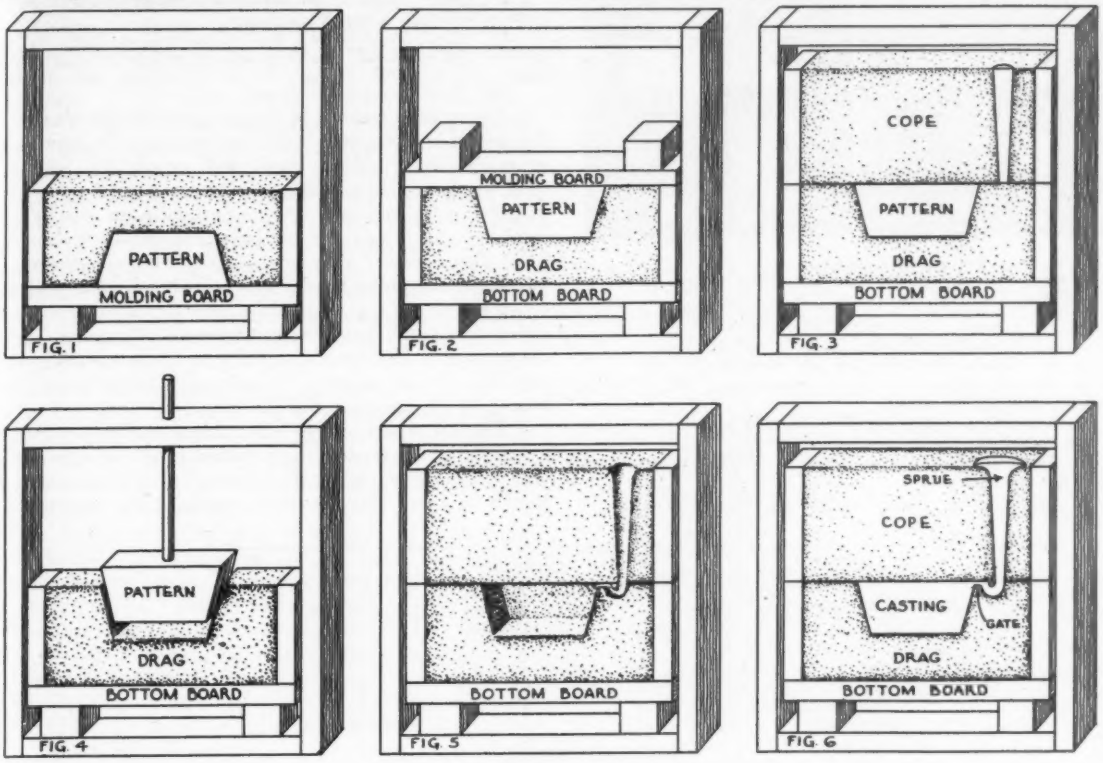
In making this model it was found impractical to use molding sand for filling the flask sections, because the sand dried out and settled against the glass cover, making it impossible to handle the panel for instructional purposes. To overcome this difficulty, a 2-in. block was used to represent this molding sand. The block was given a coat of shellac. This was allowed to dry for a few minutes, and then dry molding sand was sifted over it. After two or three coats of sand were put on, the surface appeared exactly as if a section through a mold were shown. The outline of the pattern was laid out upon the surface of the 2-in. block and shellacked black to give it the appearance of the pattern. When making one of these boards, care must be taken not to let the sand lap over on the portion which is to resemble the pattern.

The third panel, Figure 3, shows the pattern as it appears embedded in the drag with the cope above it. The block which represents the cope sections is free to slide up and down inside the case. This makes it possible to lift the cope from the drag. A thin line of parting powder is placed along the top edge of the drag section to show what is meant by the "parting line."

The fourth panel represents the mold after the cope has been removed. This panel is designed to show the method of drawing the pattern and also the meaning and importance of draft. Instead of making this drag section out of a 2-in.

block, it was made of two pieces 1 in. thick. The top piece was cut out to the shape of the pattern and fastened to the lower piece. This left a cavity the size of the pattern. A 1-in. block was finished to represent a pattern and was set into the cavity. A ¼-in. dowel rod was then fastened into the pattern and extended through the top of the case. By lifting up on this pin the pattern can be drawn out of the drag.

The matter of deciding upon the specific problems or points to be illustrated will depend to a large extent upon the course that is presented in any particular school. The trade school will naturally include practically all of the major problems in molding. The part-time school, due to the limited time the student spends in the class, must of necessity omit many of the molding problems. The task then becomes one



STEPS IN MOLDING A PATTERN

Step No. 1. (Fig. 1.) Place the pattern upside down on the molding board. Sift sand upon the pattern until it is completely covered and until the drag part of the flask is completely filled.

Step No. 2. (Fig. 2.) After the drag has been rammed and the bottom board put on, the flask is turned over. The molding board is now on top of the pattern instead of below it. The molding board is then taken off and laid aside until the next mold is started.

Step No. 3. (Fig. 3.) After the molding board is removed, the cope or top part of the flask is placed in position. Parting sand is lightly sifted over the top of the drag. Then molding sand is sifted into the flask. After the cope is half full of sand, the sprue pin which is a round stick which forms the opening or sprue, is placed in position. More sand is added until the entire cope is rammed up.

Step No. 4. Figure 4 shows the appearance of the pattern after the cope has been lifted from the drag. The pattern is now ready to be drawn out of the sand. By lifting the pattern with the lifting rod, one can see what is meant by draft and why it is necessary on the pattern. As the pattern is lifted, the clearance becomes greater between the sand and the pattern.

Step No. 5. Figure 5 shows the mold ready for pouring. The top of the sprue opening has been widened out a little and the gate has been cut. When the metal is poured, it flows down the sprue and then through the small opening called the "gate" into the cavity left by the pattern.

Step No. 6. Figure 6 shows how the molding looks after the metal is poured. When the metal has cooled, the casting is taken out of the sand. The gate and sprue are broken off and the casting is ready to be cleaned up to be sent to the machine shop.

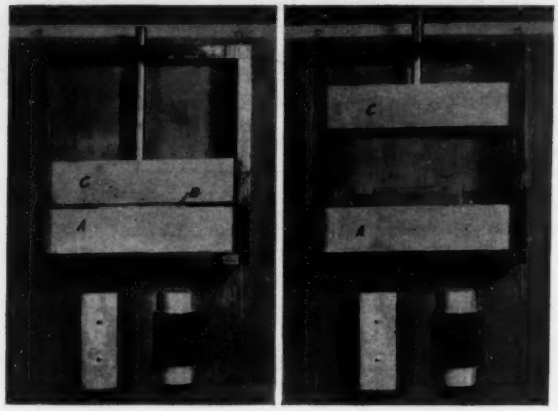
The fifth panel represents the appearance of the mold after the pattern has been drawn, the gate cut, and the mold closed. The cavity representing the casting, gate, and sprue is shown in this section. The openings are cut into the blocks and treated with shellac and molding sand.

The sixth and last panel in this group represents the casting in the mold. The outlines of the pattern, gate, and sprue were drawn on the blocks and painted red to represent the hot metal.

The detailed description of the first group of panels together with the photograph of the panel showing the setting of a core, will give a general idea of the method used in showing the points in the entire series. The ingenuity of the patternmaking instructor can be relied upon in preparing his own panels in individual cases. The method of showing the various steps in the molding process, as outlined above, can be used very satisfactorily in practically every case. Wide application of the movable models in the cases, together with the permanent form of the shellac and molding sand make this method of preparing illustrative material extremely practical and effective.

of selecting the most important or outstanding features of the molding processes. Realizing that this is no small task, I shall present the results of the shop visits heretofore mentioned. The combined suggestions from these shop foremen and checkers, when analyzed, resulted in the following tabulation of comparative emphasis upon the typical molding problems. The first point listed represents the most important factor, second, the next in importance, etc. through the list.

1. *Draft.* On pattern bodies, core prints, and core boxes.
2. *Cores and Core Prints.* Importance of shape and size of core and print in relation to each other. Core must be set into cavity left by print.
3. *Core Sizes.* Size of core with respect to its effect upon metal thickness of casting.
   a) If core is too small metal is too thick.
   b) If core is too large metal is too thin.
4. *Sharp Corners.* (See Fig. 8.) Importance of avoiding sharp corners or points on cores and in green sand. If core runs out to a feather edge, a print should be used to increase thickness of core at point.
5. *Loose Pieces.* (See Fig. 9.) Methods of molding patterns having loose pieces. Various types of loose pieces on patterns and in core boxes.
6. *Stop-Off Pieces.* (See Fig. 10.)



A is the drag, B is the core placed in position in the mold, C is the cope. The cope is arranged so that the student can lift it up to see how the core is placed in the mold.

a) Cleats.
b) Stop-off for patterns made in different sizes.
c) Stop-off for right and left core boxes.

7. *Sweeps.* Sweeps for wheel rims, gears, etc. Core-box sweeps for skeleton core boxes.

8. *Draw Cores.* (See Fig. 11.) Method of using core prints and cores to facilitate removing pattern from sand.

9. *Suspended Cores.* (See Fig. 12.) Method of setting suspended core in mold.

10. *Split Pattern.* Method of molding the split pattern.

11. *Balanced Cores.* (See Fig. 13.) Importance of long core print for a balanced core. Use of chaplets when core is quite long.

12. *Frail Green-Sand Walls.* Importance of avoiding thin green-sand walls in mold. Core should not be set against a thin green-sand projection.

13. *Rapping Plates.* Balancing points of pattern should be considered when setting rapping and lifting plates.

14. *Gang Pattern.* (See Fig. 14.) Use of plate with several patterns attached. Quantity production.

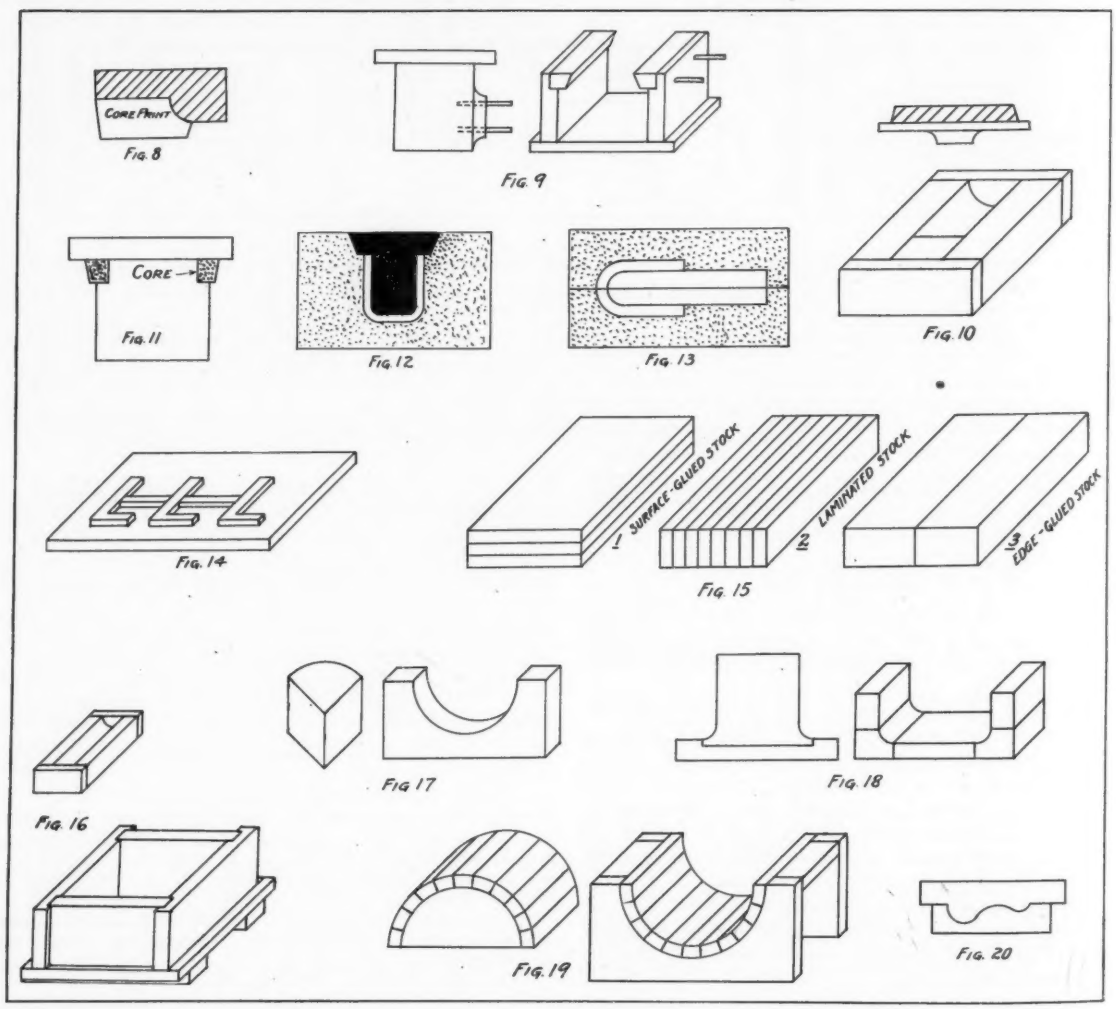
15. *Match Plate Work.* Use of molding machines.

16. *Follow Board.* Use of plaster of paris for irregular parting lines.

17. *Master Patterns.* Lightener cores.

The relative position of the points in the list above was determined in each case by two factors: First, the importance of the molding problem listed, and second, the frequency with which misunderstandings or errors pertaining to that particular point were met. As far as possible, an even balance between these two factors has been maintained. It is manifestly clear, however, that such a balance does not obtain in a number of the points listed. Where such a balance does not occur, preference is given to the matter of frequency of error rather than to the importance of the molding problem. Since the purpose of illustrative material is to clarify misunderstandings and decrease resulting errors, it seems logical to give preference to the frequency factor.

The statement covering each molding problem is sufficiently complete to suggest to the patternmaking instructor a suitable panel or group of panels to cover the subject matter. It should be noted that the above panels, being assembled in



groups or units, can be used in any course regardless of the order in which the molding problems occur. It is necessary to select from the above list, only such points as are incorporated in the course as taught in any particular shop, and prepare the illustrative material as suggested.

Construction Problems

The construction problems are illustrated on panels in the same manner as the molding problems. Uniformity in size makes the storage of the panels a simple matter. This uniformity also permits the use of one set of hangers for the entire series.

The problems which are covered in the first group of construction panels represents the fundamental steps in gluing and joining straight pieces of stock. The first panel (Fig. 15) shows three methods commonly used by the patternmaker in gluing stock. These methods are shown by means of three pieces of stock glued to represent (1) surface-glued stock, (2) laminated stock, and (3) edge-glued stock.

The second panel in this group which is not illustrated herewith, however, shows the following common joints used by the patternmaker: half laps, butt joints, miter, and dado. Each joint is shown laid out on a piece of stock. The completed joint is then mounted beside this layout.

Since most of the construction features in the patternmaking trade are more or less complicated, it requires two or more panels to fully illustrate them. For that reason the panels following the first two mentioned will cover some major point in groups of two or more.

The application of any phase of construction to the classwork can easily be worked out by the instructor. As an example: Suppose an individual has reached a point where he is ready to build a pattern from segments. The group of panels representing "Segments and Their Use," is brought out for the boy to study. A brief explanation can be given by the instructor, and the panels will serve to clarify the statements. The same general application of the illustrative material to the classwork can be made in connection with all the major construction problems.

In order to facilitate the use of the suggestions outlined herewith, the construction features covered by illustrative material in the shop have been listed alphabetically, rather than in their instructional order. Since there seems to be no set order in which the various construction features follow each other in patternmaking courses, individual instructors will find it a simple matter to select the points listed which are covered in their particular courses. Having selected these points, it will be found that the explanation of illustrative material which follows each topic will suggest appropriate panels for class use.

List of Suggested Construction Problems

1. *Core-Box Construction.* (See Fig. 16.)
   a) Small core-box types.
   b) Large core-box types.
2. *Core-Box Filler Blocks.* (See Fig. 17.)
   a) Typical examples of core-box filler blocks.
3. *Double-Sawed Patterns.*
   a) Layout on stock.
   b) Stock sawed on one view.
   c) Stock sawed on both views.
   d) Completed pattern.
4. *Faceplate Turning.*
   a) Simple chucking.
   b) Methods of rechucking.
   c) Split faceplate pattern.
5. *Fillets.*
   a) Sample of each type of fillet.
   b) Pattern with fillets applied.
6. *Fitting Boss to Cylinder.*
   a) Chalking to shape.
   b) Use of dummy.
7. *Fitting One Cylinder to Another.*
   a) Chalking to shape.
   b) Setting one cylinder into another.
8. *Flange and Fillet Construction.* (See Fig. 18.)
   a) Methods of avoiding feather edges.
9. *Laying out on Stock.*
   a) Typical layout on pattern stock.
   b) Sawed to allow for draft.
   c) Finished pattern.
10. *Rib and Web Construction.*
    a) Sample of rib and web pattern.
    b) Run of grain in ribs, etc.
11. *Segments.*
    a) Layout of segments on stock. (Conservation of lumber in laying out segments.)
    b) Finished segment.
    c) Ring partly built up.
    d) Finished ring.
12. *Shrinkage Openings.*
    a) Open joints on large work to allow for shrinkage of wood.
13. *Spindle Turning.*
    a) Band-saw mark on stock.
    b) Sizing grooves turned.
    c) Finished spindle pattern.
14. *Staves.* (See Fig. 19.)
    a) Header with staves attached. (End view.)
    b) Header for core box with staves attached.
15. *Templates.* (See Fig. 20.)
    a) Typical sample of template.
    b) Template with chalk applied.
    c) Pattern with chalk marks upon it.
    d) Finished pattern with template in place to show duplication of template contour.
16. *Wheel Construction.*
    a) Arm joints at hub.
    b) Arm joints at rim.

In closing, there is one phase of the foregoing illustrative material which might well be mentioned again. The twofold use of the material by the teacher and by the student renders it doubly effective. The chief objection to some of the illustrative material which was used in the past, was based on the fact that the material was not designed to be used by the student at his bench. The panels described herewith are used by the instructor for general demonstrations and also may be used by the individual student at his bench. In this way the boy has an opportunity to help himself in solving some of the problems which arise while he is constructing a pattern.

COUNSELING

Bertha M. Monroe, San Francisco State Teachers' College, San Francisco, California

"But" her mother was saying, "what is this advisor teacher?" "Well, she just tells the class all they need to know," responded Beth Brown, aged 15, high-school sophomore, ending the conversation.

Later in the week Mrs. Brown who had been a delegate to a parent-teacher congress was returning home in the usual state of mixed emotions common to delegates. Among other things, a brisk young man of confidence had told them how he administered vocational guidance to 2,200 young persons in their high school last year, and proceeded to give facts and figures calculated to imprint its success upon his listeners. "All in the space of less than a 300-day school year, how does one acquire this gift of counseling," murmured Mrs. Brown. "I'll ask Mary."

But Mary was her husband's sister and a doctor, and she answered that "counseling was listening to someone relate their symptoms, if they were still able to talk," all of which Mrs. Brown considered a flippant answer so she hunted up Dora who taught in a college and lived in a settlement house where persons rushed in with complaints, requests, and troubles.

Dora laughed when Mrs. Brown put the question and said, "Anyone can counsel, and humanity's God-given protectiveness keeps them from being harmed by it." Seriously, counseling is an inquiring process, an intricate and extensive

feeling-out which by its very nature must cover a longer period of time than most people think.

Since it is easier to save than to salvage, the big business organizations long ago saw the economic advantage of personnel directors. In fact the schools are about the only big business institutions operating without this expert aid. Professor Geo. F. Meyers of the department of education, University of Michigan says that only 28 cities out of 113 with a population of more than 50,000 have officers in charge of vocational guidance in their schools. There is a functioning of guidance in many of the 85 cities but no person is at its head.

In schools, vocational guidance is the established title but I prefer the word you used, "Counseling." One is asked for help in directions away from the vocations just as often as in that direction. Students ask advice on all manner of subjects if they are convinced that the information is real, authentic, and dependable. So many motives prompt them to come to you and question. It may be done only to imitate some admired contemporary, or it may be the desire to impress you, or it may be only a social gesture, but whatever it is, it indicates seeking, and this merits respect. Many tentative advances are desirable before a path is fully determined.

Yes, the reading of books is an aid in counseling, psychology, sociology, economics on a functional basis are fundamentals in the equipment of a counselor, but field and research work are of equal weight. Counseling is a profession just as much as the work of a physician, a lawyer, a nurse. To counsel wisely, one must have known much of life and understand his fellow men beyond the average. Not only interest and sympathy with many types of endeavor, but actual participation in them rather than the sympathy of the onlooker which is likely to be an attitude rather than a conviction. Counseling, then, can hardly be the part-time work of a principal, registrar or some other warm-hearted person during off periods of teaching. Too often, however, it is just that. The ability for such work is rare and when found, it seems that this person is quite universally overloaded with work both inside and outside the classroom. Much advisory work has been laid on the classroom teacher as a regular part of her work, regardless of her desire or her fitness. It is rather a fact that teachers as a class have slender contacts with people and things. Elementary teachers begin by getting an education which gives them a rather narrow equipment for their work. They do not obtain a wide range of information, but rather a thorough grounding in the technic of subject teaching. A surprising number of them are not students, and once they have a credential permitting them to teach, are satisfied to subscribe for one teachers' periodical, preferably one which gives patterns or ideas for use. Beyond this, they may read not even the daily paper to say nothing of heavy magazines. A check-up at the library reveals that fiction makes up the greater part of their reading, and there you are. They came from school, entered another school, came out of that school and entered a school again. School has been their life, and now in contact with immature minds, there is nothing to challenge them, especially not if youth is not permitted free speech to a teacher.

No, a system of advisory teachers can never take the place of an organization with a counselor at its service. A naive remark of an art professor years ago occurs to me that you do not need to know how to draw to be able to tell others how, but human material can hardly be experimented on as cheaply as paper. It goes without saying that whoever takes over the work of counseling youth will, first of all, be of the teaching staff. There are many needs and reasons for this, but it should be a person who, in addition to a variety of teaching experiences, combines with it the experience of ventures or excursions into highways and byways outside of a teaching régime. Granted a personality which inspires confidence (and the further ability to keep a confidence), richness of experience is the second consideration. A married woman is preferable to a single woman. A mother is still better because she has invaluable experiences which have a definite relationship to counseling. A man who has not shared and met life in teamwork, lacks accordingly, but most important of all is the quality of seeking which leads one out into the world of one's fellow men, leads one to have an interest in the things which they do, and the tools which they use. A counselor must be ready to make a never-ending investigation of life, as it were.

As for the student, he is never seen completely as we view the individual before us. His early and present environment should be first considerations in any advice that may be offered. Thus, the confident young lad that tells you he desires to be an attorney is at once placed on a different level if you find that his father, uncle, or grandfather have embraced that calling. You know that the family has some of the standards and traditions that are peculiar to a certain station in life by which their conventions in society have been determined.

But say that this hopeful youngster before you has come from immigrant parents where English has never become the home language. You know at once that he has been subject to customs, traditions, and standards of another land, at least to some degree. True such a boy is richer perhaps than the one who has knowledge of but one culture, even though that culture be on a rather privileged level, but at this point in the boy's life, this culture richness has not the same value it will have in his adult years. In fact it is now a deterrent, consequently, he needs to be surveyed somewhat more thoughtfully. Actual ability in his academic work must be a dominant factor in his equipment, as well as a dogged persistence if he is going to be able to be successful later on as a lawyer. Then his personality factors—does he compel or invite, has he the power to observe, does he possess the ability to make ready adjustments? All of these factors must receive attention before one can be at all safe in advising him. This means weeks of scrutiny. It may mean months before your material is clearly indicative.

Too often counseling is confused with merely making a statement of requirements. H——— wishes to engage in some line which involves chemistry since he enjoys this subject. The advisor then lists the activities of which chemistry may be a part, gives him the technical requirements of each occupation, and considers his work concluded.

But can it be done thus? First of all, desire in itself is an unreliable factor since there is no relation between desire and ability. View H——— again. Is his dominant interest in science general? Has he narrowed it to one field of routine procedure? Is he painstakingly accurate? Is he highly persistent and able to work alone? Is he of the temperament which will be happy in isolation on some research much importance does he place on the financial gains to be problem, or is he greatly inclined to be social? Just how expected, and, too, is his physical equipment adapted to the requirements of this chosen field? All this granted on the provision that capacity and success in his present work in chemistry is distinctly indicated.

Counsel should commence at the beginning of junior high school and extend through college or university. With college students I have been struck with the gap that made itself apparent in a written discussion of the desirability of a college education.

Evidently, in their minds, there was no middle ground between professions (in which I have discovered they include business) and the low levels of labor. Mention a farmer, a postman, a chef, a brass molder, dozens of others, and ask for a classification, and the group will frankly admit of a total lack of knowledge. Why? They come from these middle-class homes in the far larger proportion, but each

seems to regard herself as an accident! It isn't that during their high-school years that there was no dignity attached to this great middle ground, but rather that it was *never mentioned at all*. Parents and teachers were engaged in the task of making all persons equal.

In a large junior high school where most of the children are of foreign parentage, and at that of a nationality not possessing a great affinity for books, the advantages of being teachers, stenographers, and office workers are about the only occupations set forth. This group needs information concerning crafts, shopkeeping, trade and industry if we are to have their greatest contribution with a maximum of happiness for themselves. This, far from being an isolated instance, is a situation that is quite universal in the United States where 70 per cent of the pupils in high schools expect to enter the professions, while barely 5 per cent are gainfully employed in them. Artificial standards take root in a school goal of grades, which permit passing to be a greater consideration than all other factors. Scholarship alone, then, determines the worth of the individual, all predicated on the idea that all worth-while persons go to college and that college-entrance grades are the paramount reward for *good* and studious boys and girls.

Counseling is a long process. Hasty prognostications are to be avoided. Many conferences must be held, and a thorough analysis of the background factors of the person who is being counselled must be made.

Much informational material must be placed at his disposal (for the last thing that a counselor should do is to make up his mind for him) the more he knows, possibly the less inclined he may be to embrace the field which now seems to occupy his whole attention. Above all, nothing should be settled too hard and fast if the student is very young. Life is movement and we learn by seeking.

CORRELATING GUIDANCE WITH PRACTICAL ARTS IN THE CONTINUATION SCHOOL

Robert Walker, Instructor of Practical Arts, Continuation School, Trenton, N. J.

THE PRACTICAL-ARTS work in the continuation school affords excellent motivation for guidance. The dominating aim of most boys in the continuation school is the desire to improve their economic status. Through their contacts with the work which they do and those who hold superior positions and between the disparity of remuneration of the nonskilled and skilled worker, discriminatory attitudes have been developed. Their present positions are thus considered temporary and mere stepping-stones to better ones in the future. In order that some of these hopes may come to realization, a knowledge of industrial relationships is necessary. Using the natural desire to engage in manual-training activities as a compelling motive and tying up the study of occupations and industrial relations to these activities amid surroundings that have similarities to the places in which they work, affords an ideal situation in which to convey to the young workers this knowledge which will be helpful in guiding them to betterment in their social and economic life.

The following plan which embodies the idea of social betterment through improvement in economic status is in successful operation in the continuation school at Trenton, N. J.

Purpose: To promote civic and vocational intelligence.

A. *Organization of Activities*

The general shop or multiactivity scheme for meeting the varied interests of pupils engaged in manual-training activities adapts itself admirably to the practical-arts work in the continuation school. Under this plan, a flexible program of activities in different industrial fields which tends to stimulate interest, develop ability, and result in achievement, insofar as present shop facilities permit, has been devised and is in operation in the school shop.

B. *Aims*

In general, the specific aims of the work are as follows:

1. To provide work for everyone.
2. To allow a selection of the kind of work best suited to the individual.
3. To give exercise to interests and aptitudes, which have been developed in previous school experience or through contacts with industry by providing opportunity to continue at selected work during attendance at the school.
4. To allow easy transition from one kind of work to another in order to stimulate changing interests.
5. To allow for the development of activities that may be classified as hobbies or avocational interests.
6. To provide opportunity for the construction of group projects for the development of cooperation.
7. To give information concerning industrial conditions, trades and occupations, required preparation, and the relations between the worker, employer, and the community.

C. *Kinds of Activities*

The activities are built around the two great materials of construction most commonly found in industry; namely, wood and metal. The classification of the work is woodwork, metal work, electrical practice, and molding.

a) *Activities in Woodwork*
1. Toymaking
2. Boat models
3. Furniture building
4. Home mechanics
5. Airplane models
6. Projects for home use
7. Group projects

b) *Activities in Metal Work (Sheet Metal)*
1. Window boxes
2. Cabinets
3. Kitchen utensils
4. Metal airplane models
5. Bicycle repair

c) *Activities in Electrical Practice*
1. Bell work
2. Exercise wiring
3. Radio construction
4. Induction coils
5. Transformers
6. Meter reading

d) *Activities in Molding*
1. Split patternwork
2. Solid patternwork
3. Molds from wood cuts
4. Core work

D. *Classroom Procedure*

1. Short discussion on industrial relations (15 minutes duration).

Some topics considered:
- *a*) How to apply for work
- *b*) Where to find work
- *c*) What the employer expects
- *d*) What you should give the employer
- *e*) Analyzing your present job in terms of permanency and promotion.
- *f*) The status of skilled and nonskilled workers
- *g*) The service the worker performs for society

h) The qualifications and preparation needed for certain kinds of work
i) Job shifting
j) Industrial hygiene
k) Factory rules

2. *Selection of work*

Models, pictures, drawings, and blue prints of varied kinds and types of articles are used to stimulate interest and they range from simple problems to more difficult ones in order to meet the differences in abilities. Work on school projects, such as tool cabinets, etc., is provided for pupils who have no immediate interests.

3. *Construction of Projects*

Individual instruction is the order of procedure. Only such skills that are needed to successfully complete projects are emphasized.

Time of period, 90 minutes.

Fifteen minutes for class discussions, and the remainder for activities.

Some Results

1. Many of the boys who attended the continuation school have developed hobbies to the extent of practicing them at home in improvised workshops. As instances, one boy is interested in airplane models. He has made different types of models and his time in the school shop is spent in furthering the development of his interest. Another is interested in radio building and does a good part of this work at home. Others spend their time at home making toys, boat models, or molding castings of lead and aluminum. These interests are stimulated in the school shop by providing recourse to drawings, books, and magazines bearing on their interests, and by activities in their field of interest. Leisure-time activities are advised and fostered, and the influence of the school undoubtedly contributed largely in the instances cited above.

2. A check-up on some former continuation-school boys reveals that they are now employed as apprentices or helpers in the skilled trades. The plumbing, electrical, painting, machine-shop and woodworking crafts have boys who attended continuation school. Discussions frequently held on industrial status and relations have undoubtedly had an influence in shaping the future work of these boys. Through these discussions, many boys have been influenced to attend evening school and pursue courses at the school of industrial arts.

A case which exemplifies the desirability of diversified activities in the continuation school is that of a boy who was interested in molding. His employer had promised him a job as a molder apprentice when he reached 16. Upon investigation, it was found that he had been practicing molding in the woodshed at his home. Facilities for molding were set up in the school shop and he was allowed to experiment and develop in his interest. Other boys who were working in foundries or interested in molding were given instruction in this work. Aside from providing an interesting activity to many boys, this experience has resulted in the employment in foundries as apprenticeship molders of two former continuation-school boys.

THE VOCATIONAL TEACHER AND HIS BLACKBOARD

Wm. A. De Vette, Wilson Junior High School, Erie, Pa.

(First Article)

How many vocational or industrial-arts teachers are there who have not given vent to the question, "Oh, why haven't I more blackboard space?" How many have not asked for more either by direct requisition or waited until it was time for next year's budget to be turned in? And eventually when more blackboard space is supplied what happens to it.

Too often the supervisor coming into the room sees this same blackboard partly obscured by blue prints hung from the upper molding, by templets, pieces of scrap material, etc., stuck in the chalk tray, a cumulative record of the year's home-room school banking covering half of the remaining area and the rest filled with a lot of more or less meaningless hieroglyphics, the accumulation of weeks of answering individual questions with a hastily drawn diagram.

The above it not a condemnation of the practices of our practice as shop teachers but rather an appreciation of the fact that while we sense the value of a properly wielded piece of chalk, we must admit that we do not use it as effectively as we should.

Many of us who have forsaken the industrial shop for the school shop, have been in the habit of using the back of an old envelope, a piece of wood, and even the wall for the purpose of making an explanation more clear to a fellow worker. We make use of the blackboard in the same way now, and we do not take cognizance of the fact that each succeeding class coming in looks past us to the board to "admire" our handiwork. If we recognized this fact, our blackboards would not appear as they do now.

A member of the department of public instruction of Pennsylvania recently stated that in his opinion the vocational teacher does not use his blackboard more because he is afraid of it, afraid of his ability to execute a drawing neatly and quickly before a class. This article is written to remedy this condition as far as possible.

We all realize that our blackboard may be an invaluable asset in presenting lessons to our classes, an aid in helping them to visualize their problems more clearly.

In vocational education particularly, where the lessons always deal with concrete, tangible things, the ability to make a good, clear blackboard drawing should be one of the prime essentials of a good teacher.

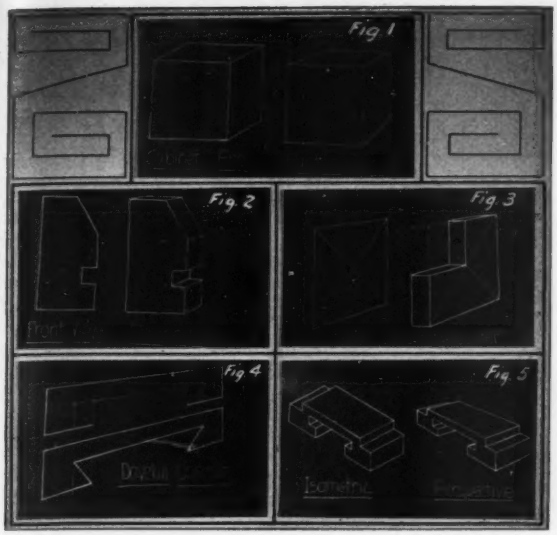
The effectiveness of a blackboard drawing is doubled when made in the presence of the class. The development of the picture on the board arouses the students' interest in the problem.

Successful blackboard illustration depends on two main items: First, a clear conception on the part of the teacher as to what is to be portrayed on the board, and second, the ability to execute the drawing quickly and neatly with a minimum number of lines.

Orthographic Projection

No doubt the simplest method for the teacher to use in illustrating a problem on the board is orthographic projection or what is more commonly called "working drawing." In many industrial-arts classes, however, and in many trade classes as well, the students do not yet possess the ability to interpret such a drawing correctly. Therefore, unless the reading of drawings is to be a part of the lesson, pictorial rather than technical representation should be used.

Many a school-shop instructor will immediately say, "That's all right for the drafting teachers but we cannot be expected to do that." The problem of learning to make good blackboard illustrations, like learning to swim, is not one of ability but of self-confidence. Pictorial blackboard drawing is not difficult.



In order to get a more favorable point of view of the situation, let us first classify the methods of pictorial representation that are available to the shop instructor for use on his blackboard.

Pictorial Representation

All blackboard work must, of course, be limited to line drawings and they fall under two main groups.

1. Drawings showing one vertical face of the object parallel to the surface of the board.
2. Drawings showing the vertical faces of the object at an angle with the surface of the board.

These classifications may each be divided into two groups:

Group 1.

a) Drawings in which the receding lines are all parallel to each other and at a 30-deg. angle with the horizontal (cabinet drawing).

b) Drawings in which the receding lines converge toward a vanishing point in the horizon line (parallel perspective).

Group 2.

a) Those in which the receding lines slant at a 30-deg. angle with the horizontal in both directions (isometric drawing).

b) Those in which the receding lines converge toward two vanishing points in the horizon line (angular perspective).

Cabinet Drawing. As has been noted above, cabinet drawing shows the object with one face parallel to the board. All surfaces perpendicular to this are drawn at an angle of 30 deg. with the horizontal and are made one half of their true length.

This method has two distinct disadvantages; the measuring takes too much time, and the fact that all the receding lines are parallel makes the object seem to be larger at the end farthest from the observer. It violates the rule that the farther a thing is from the observer the smaller it should be in the picture. In blackboard illustration, it makes the objects appear too distorted to be of very great use and this method may well be omitted from further discussion.

Parallel Perspective. The position of the object is the same in parallel perspective as it is in cabinet projection but a horizon line is assumed and the receding lines of the drawing converge toward some point in this line in the same manner as is observed by a person standing at one point on a long, straight piece of railroad track. The rails, the fences and the telegraph lines seem to meet at the point where they disappear from view at the horizon line.

A comparison of the two types of drawings is made in Figure 1. Note the distortion in the picture at the left.

A drawing of an object in parallel perspective may be very easily made by first drawing the front view of a working drawing of it and drawing all edges perpendicular to this face converging toward some point in the horizon line. This point may be placed almost anywhere but preferably at the upper edge of the board, and usually to the right of the drawing.

A front view of an object and a similar view made into a parallel perspective are shown in Figure 2. It can readily be seen that such a drawing may be made on the board without any difficulty.

Often it becomes necessary to find the center of a square or a rectangular surface thrown into perspective. This point can be found by lightly sketching the diagonals as shown in Figure 3.

Another simple kink is used in drawing the sides of a dovetail. By lightly blocking off the maximum and minimum distances across the dovetail, the sides may be drawn with confidence in the result. Figure 4 describes the method.

Isometric Drawing. Under the second classification of blackboard drawings come those in which the object is placed with its vertical faces at an angle with the board. In isometric drawing, the receding lines both slant at a 30-deg. angle with the horizontal and in opposite directions. Vertical edges are shown vertical. All edges are drawn full length and this makes the picture appear larger than the object itself.

The disadvantages in this type of drawing are the same as in cabinet drawing, namely: it takes too much time to measure each line and the resulting drawing looks distorted because it violates the rule of perspective. Still another disadvantage is the awkwardness in handling blackboard triangles, and the fact that in rubbing them over the drawing, the latter gets a decidedly mussy appearance.

Angular Perspective. Angular perspective is similar to parallel perspective in that the receding lines converge to a vanishing point in the horizon line, but due to the fact that the object is turned with the vertical sides at an angle to the board there will be two vanishing points instead of one. There may possibly be more than two vanishing points but that will be discussed later.

A comparison of isometric drawing and parallel perspective in made in Figure 5.

Fig. 6.

The Chalk Line in Perspective Drawing

There are many teachers who seem to have trouble in developing a proper sense of perspective. The result is that they get their pictures distorted. Developing this knack may be greatly facilitated by the use of the chalk-line and rubber-band device which was illustrated on page 202 of the May, 1923, issue of the INDUSTRIAL-ARTS MAGAZINE. Figure 6 shows this device being used. It consists of a piece of light chalk with a rather heavy rubber band fastened to each end and a series of brads driven part way into the blackboard molding at short intervals.

By looping the rubber bands over any two of the brads it is possible to get two vanishing points for almost any drawing desired. The rough outline of any drawing can be blocked in very quickly with this device. Gradually, as the drawings become more easy to visualize, the chalk line can be dispensed with for rapid work and later for all work.

INDUSTRIAL-ARTS MAGAZINE

EDITORS

E. J. Lake *J. J. Metz* *S. J. Vaughn*

ABOLISHING THE INDUSTRIAL ARTS

The question whether or not the industrial arts should be abolished from this or that school comes up again and again. This in itself is a fine thing, because opposition always creates strength, and this strength produces growth of the right kind. The courses which are continually being scrutinized for their value, are usually strengthened and improved until they really are valuable.

But are the industrial-arts courses necessary in our schools? There are many who would lead us to believe that if we succeed in teaching our pupils the three R's, we have accomplished all that is really necessary. They point out, with what they think is crushing logic, that great men such as Washington, Thomas Jefferson, etc., did not spend any time on manual training and the like, while they attended school, and yet they became great leaders. Those who advance these arguments fail to take into account that the entire industrial and commercial complexion of this country, nay of the world, has changed since the men whom they mention, received their education. From a civilization where most of the workers were engaged in agricultural pursuits, we have gradually emerged into an era of unparalleled mechanical inventiveness. The ox-team method of transportation at one time was quite good enough for us, but today we are just satisfied with the speed of airplane travel and are wondering how long we must be content with such moderate speeds as 100 to 150 miles per hour. Would education which was ample for the ox-team period suffice for this day and age? No one, upon sane reflection, will contend that it would.

The lowliest laborer of today has at his command conveniences the like of which were beyond the dreams of the wealthiest man in our early colonial days. The mechanic of today demands as his due, conveniences which were totally unknown to Abraham Lincoln, U. S. Grant, and even the presidents as late as Grover Cleveland. Yet the objectors to some forms of our modern education would make us think that the minimum essentials thought adequate 100 or more years ago, are sufficient today.

In the face of all this, why then the periodic recurrences of this pernicious criticism which seems to aim at the discontinuance of manual training in the grade schools or the high schools, this or that city or group of cities? Probably the two main factors upon which these criticisms are based may be roughly classified as the inadequacy of the work offered to the students, or the economic question of furnishing the finances required for carrying on the work.

The first might probably be blamed on the teacher or on the school administration. A system of industrial arts which has been allowed to deteriorate into mere busy-work, has no right to exist. Industrial-arts work presupposes vital objectives, and work that adequately covers them. Usually, however, the inadequacy of the work is due to lack of financial aid. Because the money for carrying on the work is not forthcoming, the school administration, loath to discontinue work that to them seems so vital, carry on with insufficient funds thereby, of course, sacrificing efficiency.

The mayor of an eastern city, with the approval of the city council, simply ordered a flat cut of 10½ per cent from the school budget that had been submitted to him. A reduction of such magnitude naturally hampered all of the educational work, and the first to suffer were such subjects as industrial arts, domestic arts, etc.

Of course the industrial arts, because of the equipment they require, and the added room which they need, to say nothing of the specially trained teachers which they necessitate, are more costly than the purely academic subjects which can be taught to groups of sixty or more. But the great inherent values of the industrial arts, which makes them the vehicle for vitalizing every one of the purely academic subjects; the medium which permits the pupil to try out actual life situations in the school shop; the aid which it gives the student in making earlier determinations of what to follow as a life's work; the opportunity which they afford in preparing for future specific life activities; all of these must be taken into account when the true value of the industrial arts is being discussed.

On the whole, we need have no fears that the industrial arts will be abolished in any appreciable section of our country. Their value has been too well established to those who can look beyond the mere exigency of the moment. The ill-advised, sporadic attempts of some person or group of persons to interfere with the growth and development of the industrial arts should act as a spur to every teacher in the industrial-arts field to so improve the teaching content of his course, his method of presentation, his system of taking care of the individual differences of his students, that the efficiency of teaching becomes ever greater. The results of the work will then be great enough to outlive any criticism based merely on unit instruction cost.

—+—

LOOK AHEAD

"In times of peace, prepare for war" is an old proverb which has been abbreviated in modern times to the two words "Be Prepared." Although we have just about crossed the threshold of vacation time, yet it behooves us to think ahead to the opening of the new school year next September.

Mr. F. E. Moore, director of vocational education for the state of Iowa, expresses this idea very well in a short article entitled "A Program of Work," published in the September, 1927, issue of the Vocational Education Survey, Des Moines, Iowa. He says:

"A competent architect would not attempt the construction of a house without well-made plans and blue prints. Although the ultimate objective is the completed structure, yet the architect would not start its building until his plans are drawn and he has given them careful study. Well-made plans furnish the builder with some of the important essentials for his program of work.

"So it is with the person interested in building a constructive program pertaining to the education of the schoolboy or girl. It is essential that the classroom teacher select with care her objectives and prepare well-made plans in order that her year's work, as well as each class meeting, will have the greatest possibility of success. In addition to selecting such objectives and preparing plans of procedure, the teacher must also make use of her plans if she is to attain the highest degree of success in her work. Likewise, each school, institution, and educational organization must establish in its program of work, the major objectives and well-chosen plans for their successful completion, if the desired goal is to be obtained."

During these glorious summer months, wherever one sojourns, thoughts of the coming school year will crop up from time to time. Many of these will contain the germ of future growth, but they must not be allowed to escape lest their fate be that of the seed that fell on barren soil.

A well-known teacher trainer makes a practice of carrying with him a small package of 3 by 5-in. cards. When he is engaged upon the preparation of an article, lecture, or

course, he jots down at random on these cards, every thought that strikes him which has any bearing on the subject upon which he happens to be working. When he is finally ready to write on the subject, he has a great deal of material around which he can build his article.

A little package of 3 by 5-in. cards will not occupy much room in your fishing-tackle box, or in the side pocket of your auto. It will be handy, however, when you have some good idea about your objectives and plans for next year's work. Preserve these thoughts. They may probably be very valuable later on.

—⟡—

COURTESY ?? TO THE SPEAKER

The editorial "Thinking of Others" which appeared in the July issue of the INDUSTRIAL-ARTS MAGAZINE caused someone to say, "That reminds me" and he related the following: "Recently I attended an assembly of students in a teacher-training college which had been called for the last period of the day for the purpose of listening to the address of a prominent educator who had chanced to visit the school that day.

"Promptly at the appointed time, the classes accompanied by their instructors marched into the assembly hall. Presently the speaker was introduced and he commenced to deliver his message which was both instructive and interesting. Suddenly there was a disturbance at the rear of the room. At first those nearest to it, commenced to turn around to see what it was all about. Then those nearer to the front began to crane their necks. Finally, the speaker himself became uneasy, and he stopped in the middle of a sentence and patiently waited. Of course, this sudden cessation of the speaker's activity caused a lull which made everyone in the assembly come to attention, and the speaker took up the thread of his discourse again.

"It was but a few minutes later, when the disturbance again commenced. This time the speaker abruptly stopped, and then he courteously demanded that the president of the institution to have the disturber removed from the auditorium. This was done, and it was found that the disturber was one of the teachers from the teacher's college. Her explanation was that she had failed to take the attendance record in her class, and as this was the only opportunity she had to make up her deficiency, she was handing out slips of paper to her students, and giving whispered directions what to do with them.

Just another example of not thinking of others. She did not think of the courtesy that was due to the speaker; she did not think of the humiliation she was causing the president of the school; she did not think of the loss she was causing the students by robbing them of at least a part of the speaker's message; she did not think of the wrong example she was setting her students; nay, she even forgot to think of what effect her thoughtlessness would have on her own position as instructor in a teachers' college.

Moral: Do not be so egotistical that your courtesy to others, and your better judgment are totally eclipsed by your own ego.

—⟡—

SQUELCHING AMBITION

A young lad was swimming with his brother at a bathing resort in one of our large mid-west cities. The boy evidently was a beginner because he was puffing and splashing along with a great deal of extra exertion. He evidently was just graduating from the school of "Self Help" and evidently was doing as well as he could. One of the lifeguards, a tall, well-built, weather-bronzed fellow sat on the platform and watched the two swimmers as they passed beneath him. He evidently knew the two swimmers, because he called to the older "Joe, that kid brother of yours will never be a swimmer." There may have been a great deal of truth in what the guard said. As a matter of fact, that youngster is not a very fancy swimmer even yet, although he is a grown man now. He has, however, covered a mile at a stretch, and is in the water whenever he gets a chance. He has never forgotten, however, the heartache which those words, carelessly, and thoughtlessly spoken by the guard, had given him.

We teachers frequently make similar remarks in the same thoughtless fashion, little thinking how much suffering we are really causing. With some students, who have become calloused by harsh treatment at home, such a criticism from the teacher makes little impression further than deepening the feeling of animosity they may have for their instructor. With sensitive boys, however, it may do irreparable harm, because it may strengthen in them a feeling of inferiority which they will be unable to overcome throughout their lives. Of course, there are the exceptional characters who will be spurred on by adverse criticism to overcome that for which they are criticized. Nevertheless, the method seems to be questionable at best. It would, no doubt, be better if teachers would refrain from using this method of encouraging or rather *discouraging* their pupils. It may be all right for the athletic coach, to browbeat his men with the idea that they will become "fighting mad" by such treatment, and then play the better for it. We must not forget, however, that the athletic coach is dealing with a picked group who, because of their pugnacity, thrill at the idea of combat, while the teacher in his classes meets large groups containing every type and kind of human being. It therefore must be the idea of the shop teacher to encourage ambition, rather than to squelch it.

—⟡—

OUR GREATEST PROBLEM

In our problem of educating young boys to have an appreciation of industry and industrial processes, or to enter industry as apprentices, let us not forget that the great aim of education is the training for citizenship, which includes ethical character.

It was Ruskin who said, "All education should be moral first; intellectual secondarily." This statement is just as true today as it was then, and perhaps the truth embodied in it is needed more today than ever before on account of the increased complexities of modern society.

The average shop teacher has more opportunity to give the boy this part of his education than any other teacher, for as a rule, he gets in closer contact with the student. Not all shop teachers make the most of these opportunities, but we are sure that no better work along this line is done by any other group of teachers.

This subject of moral training is one which at present is receiving the major consideration of all the fundamentals of our educational program. It is being preached on numerous occasions by prominent business men, school officials, lecturers, and even by President Coolidge.

If we care to read the handwriting on the wall, we should take stock and place more stress upon this very important part of our work. Those who have placed the major emphasis upon the mechanical skill of the student should think beyond the narrow confines of the shop. Those who have always stressed character formation, and this includes most of the vocational teachers, should make a renewed effort to carry on to an even greater degree.

A noisy car doesn't have the most speed. Likewise the *knocker isn't* usually the most efficient worker.

SUCCESSFUL ORGANIZATION SCHEMES

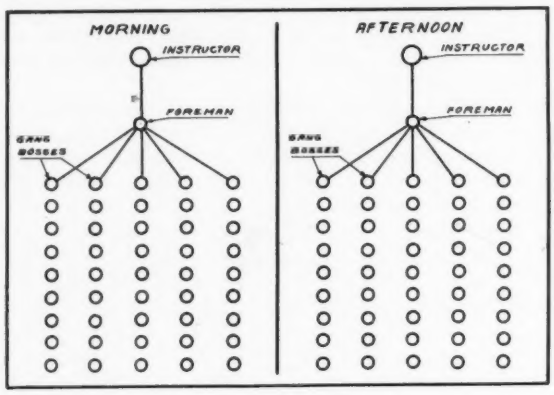
Edward N. Wallen, New York City

THE COURSE, which is given in my shop, is productive of many problems in organization. The school building is old and the equipment of the shop is not yet what I want it to be. There are many calls for immediate repairs, most of the minor ones, such as fixing doors, locks, desks, seats, putting up hooks in coatroom, etc. There are also improvement jobs in the shop, for example, putting up new countershafts, making parts for the machines, and making necessary tools. The programs of the students are therefore not uniform. The majority of the boys take shop for four straight periods, but there are some boys changing every period. Some have two periods, some three, and several have their periods scattered throughout the day.

The maintenance jobs, while valuable in developing confidence in the boy, have the effect of breaking into his scheduled work. Often the boy has to leave his work and get on a job which may take him a half hour or several days. This has the effect of slowing his apparent progress, measured by completed scheduled jobs.

To overcome this difficulty I had daily work record cards printed. These measure 3 by 5 in. They show on one side the boy's name, official class, and term in shop. There are 24 lines under this heading, divided into spaces for date, work done, and grades. On the back are spaces for home address, official teacher, official room, name of course, life ambition, and the numbers of the periods of shop taken each day. The cards are kept in a rack above my desk. The rack is similar to the racks used for time cards in factories. The boys themselves are responsible for the filling out of their own cards. Penalties are imposed for failure to fill out or for incorrect reports. At the end of the day I inspect the cards. Not only do the cards serve as attendance records but they show how much time is taken by the irregular jobs.

Another plan which is working out very well, both from the viewpoint of boy interest, and as a part of the shop routine, is an organization chart. The chart is prominently displayed on the wall. It measures 2 ft. 6 in. by 5 ft. A white line bisects it into two square sections. The background is black and a red wooden frame incloses the board. The layout of the chart is shown by the accompanying illustration. Small brads are driven into the board in the relative positions shown. White cord is stretched from the gang boss row to the foreman's nail, and a line extends from the forman to the instructor's nail. Cheap, metal-bound cardboard tags, 1 in. in diameter, colored red on one side and white on the other are used in connection with this board. Each boy's name is printed in pencil on both sides of the tag. Pencil is used to permit erasing so that the tag may be used over again. The white side is out when the boy is present and the red side when he is absent.



ORGANIZATION CHART.

The foreman is chosen by the boys. The only requirement is that he must be a boy who takes four consecutive periods. The judgment of the boys has so far been good. The gang bosses are picked by the foreman with the approval and suggestion of the instructor.

The foreman's duties are to greet the new student, instruct him in the shop routine, manner of drawing tools, filling out the daily work record, etc. The foreman enters the required data on the boy's card and then after consulting the instructor assigns him to a gang boss.

The gang boss sees to it that the tags of those boys who are absent are turned so that the red side is out. He also stamps *absent* on the daily work record. When any boy who has been absent, again reports at the shop, the gang boss brings him to the instructor before allowing him to go to work. If a boy finishes his job and does not report for a new one immediately, the gang boss checks up on him. The gang boss also collects the shop dues from the boys and turns them over to the treasurer who is also a gang boss. The treasurer in turn reports the collection to the foreman. Dues are used for the purchase of soap, towel service, dues for the mechanical-engineering society, and to provide a fund for replacing minor parts or for securing odds and ends that may be needed.

Conferences between the instructor, foremen, and gang bosses are held at intervals. Advice and suggestions are given and discussed. Weekly meetings of the engineering society are held during the lunch period. Discussions and short talks by the members on self-chosen topics are the basis of the meetings. Every effort is made to impress the boys with the idea that it is their club and that the instructor is just an advisor. When requested to do so, the instructor gives short informal talks on some phase of engineering in which the boys may be interested. Visits to manufacturing plants are arranged and publications subscribed to.

The things mentioned in the foregoing have been invaluable in overcoming many of the difficulties that are encountered in this school. The plan has been very successful and may prove equally successful elsewhere.

COVERALL CLUB AS A PREVENTIVE AGENCY

Arnold F. Tuttle, Hamilton Junior High School,
Long Beach, California

IN DEALING with problems of delinquency of boys of junior-high-school age, we shall make progress just in proportion as we appreciate the absurdity of limiting our remedies to the court, and the jailer. Boys do not usually commit wrongs against society during their school hours, nor during the time which they spend in supervised evening clubs. It is in their hours of leisure when they go wrong, and the responsibility does not wholly lie with the boys, but rather with society which has not been wise enough, nor farseeing enough, to provide means of molding the character of these children. What is needed is training which would make it easy for the boys to do the right thing, and increasingly hard for them to do wrong.

The boy craves that fundamental need—comradeship—which breeds affection. Economists have long been trying to discover how best to employ the energies of men. Emile Souvestre says: "Ah, if I could but discover how best to employ their time! Labor in plenty there is sure to be. But where look for recreation? The daily work provides the daily bread, but laughter gives it savor. Oh, all you philosophers! Begin the search for pleasure! Find for us amusements that do not degrade, joys that uplift. Invent a holiday that gives everyone pleasure, and makes none ashamed."

We may either smother the divine fire of youth or we may feed it. We may either stand stupidly staring as it sinks into a murky fire of crime and flares into the intermittent

blaze of folly, or we may tend it into a lambent flame, with power to make clean and bright our manhood of America.

So long as there are boys who need a helping hand, who look upon the school as an enemy, whose life is bounded by the gutters of the public streets, who look upon the policeman as an enemy instead of a friend; so long the boy is not getting a square deal. To give the boy a friendly hand, a heart of warm sympathy and reason, is more than justice and common sense; it is promoting sane government.

COVERALL CLUB, 1928, HAMILTON JR. HIGH SCHOOL.

The forming of the coverall club at our school was prompted by our desire to give each boy a chance to go straight; to develop his social instincts in the right way. It trains the reckless boy to conduct himself in his relations with his fellows so that his life contributes to the social well-being of all. Society demands that preparation be made for complete living. The club's purpose, therefore, is to teach the boy

AT CAMP ON MT. WILSON.

how to treat his body, how to treat his mind; how to manage his affairs; how to meet his superiors; how to behave as a citizen; how to utilize all the resources of happiness which nature supplies; how to use his leisure time; in other words, HOW TO LIVE COMPLETELY. The aim of the coverall club is to help the boy to adjust himself to our complex modern life. It aims to assist in decreasing juvenile crime and to be to the friendless boy, a real friend in need.

TAKE PEN IN HAND

Laurence Parker, Kansas State Teachers College
Pittsburg, Kansas

The other day we read of a brother and sister lost to each other for thirty years. Both lived in towns where there were post offices but neither seemed inclined to "take pen in hand" and let the other know where he or she was. Evidently, both were very reluctant to write a letter.

We wonder about such folks and why they should be "queer," but there are many folks who are just as reluctant to "take pen in hand."

"Samuel Perkins," is a successful teacher of woodworking. He has built, out of ready-at-hand materials, a sanding machine for the use of the boys. It cost little and it works. "Why don't you write it up for the INDUSTRIAL-ARTS MAGAZINE, Samuel?" we asked. "Oh! nobody would be interested," said Samuel, and so manual-training teachers continue to use less-handy contrivances or hound their superintendents for factory-made sanders.

"Andy Gump" put his head together with his director and built a toolroom in his machine shop that is "a gem." "Why don't you take a picture of the toolroom and write about the practical work you are doing and offer it to other manual-training teachers through the columns of the magazines?" "I will some day, maybe, but I hate to try to write anything to go into print." And so only a few visitors know about his excellent toolroom arrangement.

"Walt Wallet" has devised a method of having each boy check the tools as he finds them, and his report is the basis for a demerit system to discourage the carelessness of the previous user of them. "Oh yes, some day I will write it up, but I am afraid no magazine would be interested in printing what I would write."

AT CAMP AT MT. BALDY.

And so it goes. Thousands of manual-training teachers are working, each one within the four walls of his shop, each attempting to solve some problems that some other man has solved—perhaps within 50 miles of him. They may never know of the other man's solution of the problems all because the other man does so hate to "take his pen in hand."

Dr. McAndrew, that genial old philosopher, who headed the schools of Chicago at one time, gave us the true reason. He said, "I catch myself dreading the task of talking to a college faculty. When I analyze the feeling I find that egotism is at the bottom of it all. I am so afraid I cannot make the best talk that my audience has ever heard that I am reluctant about offering my best. Just plain egotism."

And so it is with us manual-training teachers. We are so afraid that we cannot write such marvelous shop articles, like Kuns' for instance, that we refuse to "take our pen in hand" and share our ideas with the other fellow. Let's turn over a new leaf, get a fresh bottle of ink and start in.

The public-school art course is getting farther away from the painter's studio. We are endeavoring to make our art courses efficient in the sense that the time of the pupil shall not be wasted; that he shall not be taught something merely because it has tradition behind it; that he shall not be taught anything that he will have to unlearn afterward; that he shall not be given the bad habit of working only when he feels like it, but shall be given an art education thoroughly practical and adjusted to the needs of modern business life and technical proficiency.—*James P. Haney.*

PROBLEMS & PROJECTS

This department aims to present a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in woodworking, turning, patternmaking, machine-shop practice, sheet-metal work, forging, foundry work, auto mechanics, auto electricity, electricity, architectural and mechanical drafting, printing, bookbinding, concrete work, farm mechanics, home mechanics, and other lines of industrial-arts work are desired for consideration.

A SCHOOL TABLE

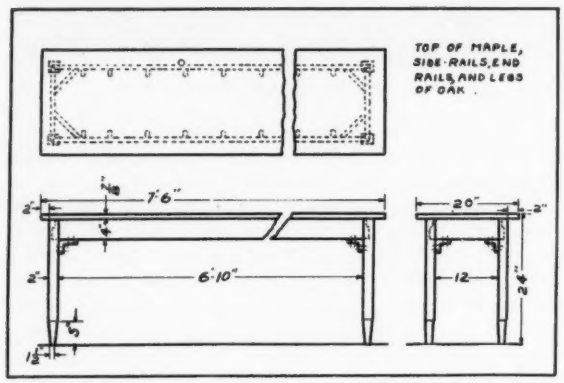
Fred Thompson, Supervisor of Special Activities
Paterson, N. J.

The table described herewith furnished an excellent production problem for a class of sixteen 8A boys working under the direction of David Petrie, instructor of manual training. The shop period was 1½ hours per week. During a period of 16 weeks, 8 of the tables were made. They were finished with 1 coat of shellac, 1 coat of varnish, dried, and rubbed between coats.

Material Required for Each Table

1 pc.	⅞ x 20 x 7 ft. 6 in.	Sugar Maple	Top
2 pc.	⅞ x 4 x 16	Oak	End Rails
2 pc.	⅞ x 4 x 7 ft. 2 in.	Oak	Side Rails
4 pc.	2 x 2 x 24	Oak	Legs

The boards for the top were doweled, using six ⅜-in. dowels for each joint. Battens fitted underneath the top were fastened with ¾-in. f.h. wood screws. The legs were mortised and the end and side rails tenoned to fit the mortises. Two by two angle-iron braces were used to further brace the table.



SCHOOL TABLE DESIGNED BY FRED THOMPSON.

The total cost of the materials used on the job was $65.36, making the cost per table $8.17. A total of 384 hours was put in on the job.

The problem also furnished the topic for one of the most interesting features of the graduating exercises. The operations involved in making the tables were explained by the pupils. The cost was discussed and the finished product shown. In this way, manual training was shown to be a definite and necessary part of the curriculum, and the manual-training instructor was shown to be an important member of the faculty.

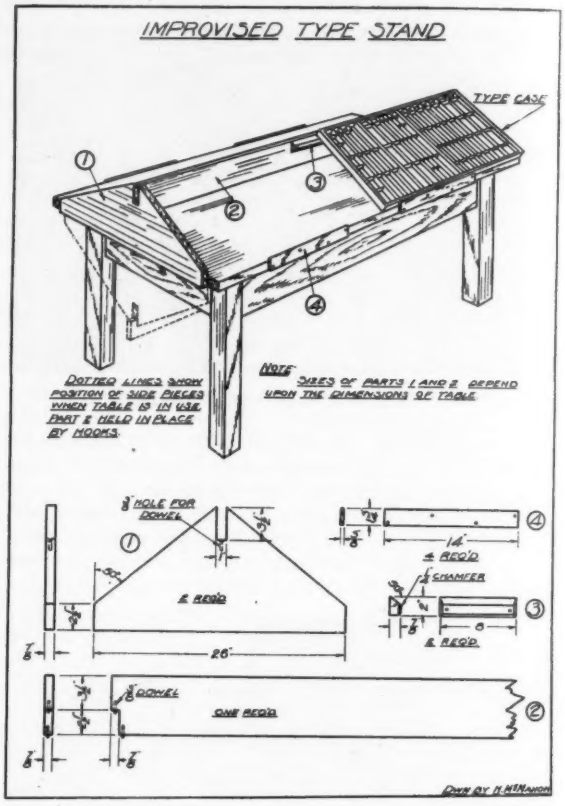
IMPROVISED TYPE STAND

Dean W. Conner and John F. Faber, Erie, Pa.

It frequently becomes necessary to furnish additional type-case space in school printshops. Especially, is this true, in small congested shops or where prevocational and vocational classes are required to use the same equipment.

A scheme to overcome this difficutly is illustrated herewith. As shown it provides for four cases. If more are to be accommodated, the table must be made longer. The table has two hinged end pieces, which, when turned up, are held together by a cross bar. When the type stands are not needed and table-top area is desired, the cross bar may be removed, the end pieces swung down, and again held together by the cross bar through the use of hooks.

In the general run of prevocational classses there are always a few small boys who experience difficulty in working at the standard case rack. The case, placed on a table, as illustrated, and slanted at the proper angle, overcomes this difficulty.


IMPROVISED TYPE STAND
TYPE CASE
DOTTED LINES SHOW POSITION OF SIDE PIECES WHEN TABLE IS IN USE. PART 2 HELD IN PLACE BY HOOKS
NOTE SIZES OF PARTS 1 AND 2 DEPEND UPON THE DIMENSIONS OF TABLE
⅜ HOLE FOR DOWEL
2 REQ'D
4 REQ'D
¼ CHAMFER
26"
ONE REQ'D
DRAWN BY H. HINMAN

The scheme ought to be of special interest to the general-shop teacher who has to arrange for teaching several shop subjects in the same room. It conserves space and the table serves a dual purpose.

The construction of the improvised type stand is simple enough to be handled by a school woodworking shop and may be made at a small cost.

CARING FOR BRUSHES

G. E. Berger, High School, Kimberly, Wis

Brushes are cared for differently in different shops. Some wash them out in turpentine, others in a soap solution. These methods take time, and where seasonable projects, such as toys, boats, or bird houses enter into a manual-arts curriculum, the method described herewith will be found very handy, not only by the manual-training teacher, but by the art teacher as well.

The brush-storage outfit consists of a series of convenient containers in which the brushes are kept in the pink of condition during the busy seasons, and during the vacation months as well.

In the striping-brush containers, the brush is suspended from a rubber stopper, in a long large-mouthed bottle, so that the delicate camel hairs do not come in contact with the bottom or the sides of the container. The turpentine which is in the bottle, in due time automatically works into the brush and dissolves all dirt and excess paint. When needed, the brush may easily be removed. It is then cleaned by drawing it through a clean cloth.

For larger brushes, the containers are 2-qt. jars. The brush is suspended from cup hooks which are fastened to the zinc can covers. For convenience, a 1- and 2-in. brush may be stored in the same jar. Water is used in the large jar, as turpentine used in such large quantities would be quite expensive.

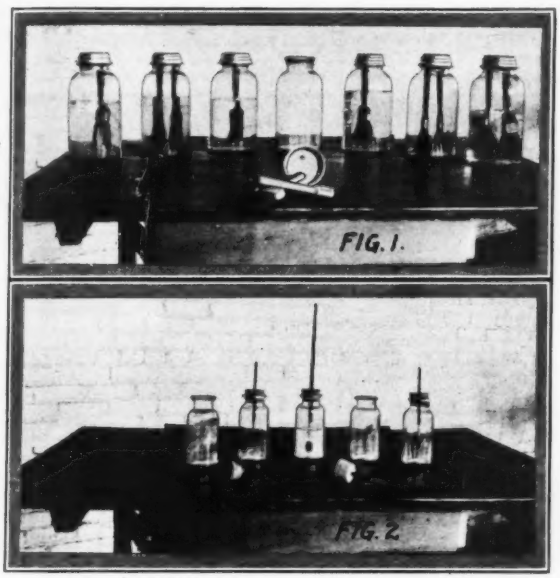
White lead will harden after a period of time in water. For this reason it is desirable to keep brushes hanging in water only during the busy seasons. When they are put away for any length of time, they may be washed in a soap solution, or in turpentine. Then after being cleaned and saturated in a soap solution they may be suspended in an empty jar and kept air-tight. The soap solution keeps the bristles from sticking together and in excellent shape. It should be washed out before the brush is used for painting again.

Varnish and shellac brushes may be kept in the same kind of containers. For varnish brushes, turpentine is used in the jar, but for shellac brushes, alcohol must be used. Shellac brushes may also be kept in shellac, in air-tight cans.

The materials for this brush-storage outfit are few and simple. Figure 1 shows the 2-qt. fruit jars with the cup hooks, while Figure 2 shows long, large-mouthed bottles with rubber stoppers.

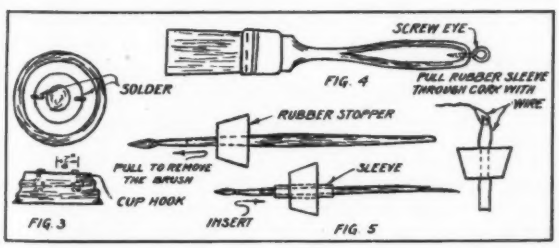
To prepare the 2-qt. fruit jars for service, as shown in Figure 3, proceed as follows:

1. Remove the porcelain insert from the cover by cracking it with a hammer, taking care not to injure the cover.
2. Mark the diameter of the cover on the inside; then measure



⅞ in. on each side of the center and punch a small hole just large enough to admit the tip of the cup hook.

3. Insert a small cup hook at each punch mark and turn until tight.
4. Clip off the ends of the cup hook, projecting from the top of the cover, flush with the cover.
5. Solder the cup hook to the cover from the top so that it cannot turn or pull out.



To prepare the brush, as shown in Figure 4, the following must be done.

1. Bore a small hole at the end of the brush handle with a hand drill.
2. Insert a small screw eye. The brush may then be suspended from the can cover.

In preparing the striping-brush bottles for service, as shown in Figure 5, proceed as follows:

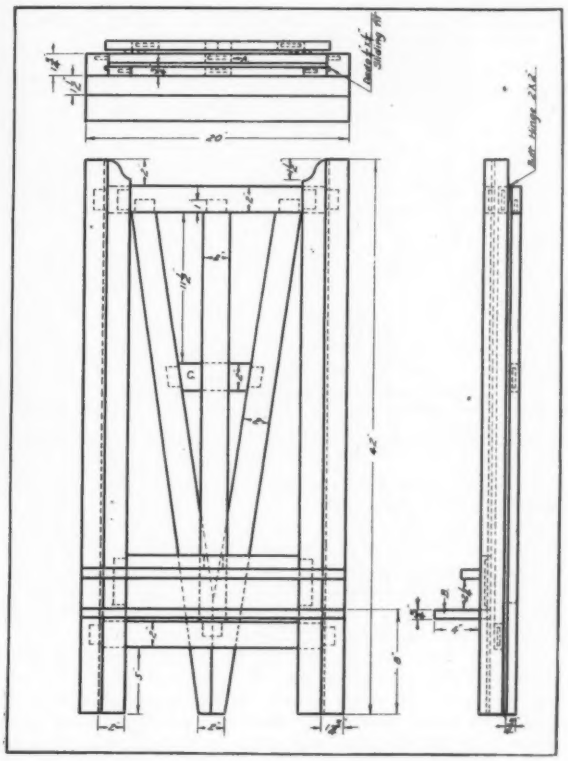
1. Obtain 8-oz. large-mouthed bottles and rubber stoppers large enough to fit them.
2. Make the hole in the stopper fit tightly around the handle of the brush, but loose enough so that the brush may be removed with ease.
3. If the hole in the stopper is too large for the finer striping brushes, draw a piece of rubber tubing through it, as shown in Figure 5.

This method of taking care of striping brushes is extremely valuable where sign painting is taught. It is valuable also to the interior decorator and artist. The brush-storage outfit just described, is an asset to any shop, and a better method cannot be found for manual-training rooms where boys of all ages meet to paint and decorate their much-prized projects.

AN EASEL FOR THE ARTROOM

William L. Hunter, University of Iowa
Iowa City, Iowa

The easel illustrated herewith is so very serviceable and convenient that I thought it worth passing along. The sliding section which holds the work is adjustable for either a sitting or standing position. It is held in place at intervals of 3 in., vertically, by a transom catch screwed to the underside of piece B and engaging or catching in notches cut in part A. Part B holds the colors and



EASEL DESIGNED BY WILLIAM L. HUNTER.

any other small materials while the horizontal piece above it serves as a rest for the work. The triangular shaped leg at the back is held to the main section by hinges and by a long hook similar to a screen-door hook fastened to part C and hooking into any one of four screw eyes screwed into part A. The four screw eyes are so placed as to afford various angles at which the easel may be inclined to suit the person using it.

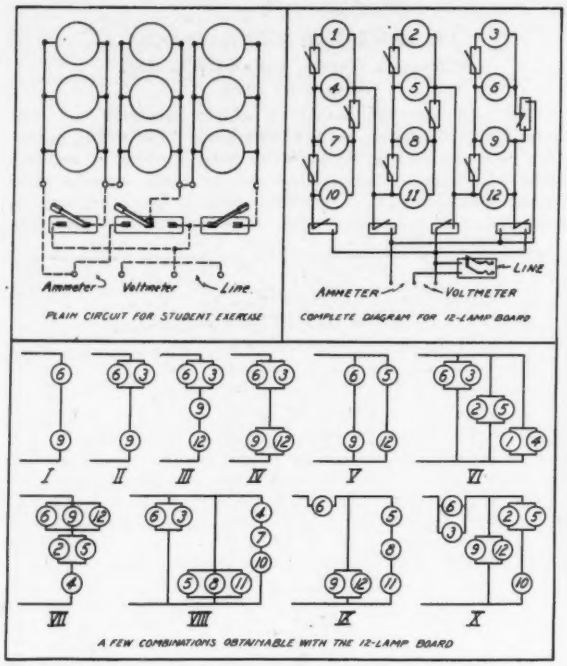
A NEW LAMP-BANK CIRCUIT

A. K. Thompson, Los Angeles, Calif.

The carbon lamp is still a convenient device to use in combination with receptacles and switches for making resistance tests or to serve as a variable resistance. Some circuits, which have been designed for these purposes, are equipped with too many switches, so that unless the proper ones are closed, a complete short results. This is a serious matter when a low-reading ammeter is in the circuit.

The lamp bank which I have devised has no possible shorts and with it many kinds of groupings of the individual units may be obtained.

In the plate of conventional diagrams, ten combinations have been shown ranging from simple to complex, but there are many others which may be set up once they have been figured out. This is a good problem for practice in circuit tracing either from the completed device or from the wiring diagram. In both cases it is desirable to write out numbered sketches of the new combinations found. Even when all seem to have been found there may still be others. If some one cares to send a supposedly complete list of all possible combinations to the author he will gladly criticize it.



LAMP-BANK CIRCUIT AND COMBINATIONS THAT CAN BE WORKED OUT WITH IT.

The plate showing the 12-lamp diagram is the circuit under consideration. The system may be expanded both as to number of receptacles per row and the number of rows. One more lamp per row would allow the row-to-row connectors to be moved to the end receptacle last added, but if the half-unit steps, described later, are desired then the number per row must be even. Rows may be added on the left and the new line returned through a SPST switch to the opposite side of the line from the last one.

On the one shown, 9 lamps are the most which can be placed in series but any number less than this may be placed in series. In case of 8 it is a little more difficult and if you wish a puzzle to fill in the long winter evenings (we don't have any of those out here) just stop reading here and figure it out for yourself, assuming equal units in all receptacles.

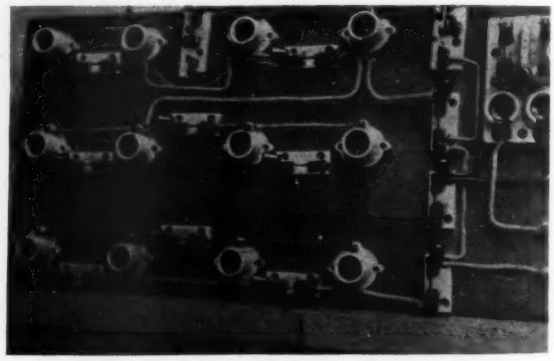
Starting on the left through Nos. 10, 7, 4, then 11, 8, 5, then 12, 9, 6, and thence back to the line. This gives nine in series, and only two switches are closed. Now close switch 1-4, placing No. 1 parallel with No. 4, and they being equal units the entire resistance is that of 8½ units. Similarly, closing switch 2-5 reduces the total another ½ unit leaving the required eight. By substituting a SPDT switch for the one in the line at No. 10 connected so as to bring the line to either side of this row, the eight may be placed in series direct by the now possible dropping of No. 10 unit.

So many units as this in series is seldom required but since they are there for making possible the more complex combinations, all the series ones were mentioned. The parallel connections are simple and any number can be placed in parallel up to the number on the board.

By making use of the scheme presented in the description of 8 in series above, progressively equal resistance changes of ½ unit each may be obtained, often in more than one way. One-half unit can be secured in four ways, 3-6, 9-12, 2-5, and 1-4. One and one half is given in group II of the plate on combinations and consists of lamps 3-6, 9. Then we have 2½ in group III; 3-6, 9, 12. Next is 3½ obtained by 9-12, 5, 8, 11, and 4½; 9-12, 5, 8, 11, 4. (SPDT switch reversed for this from 3½ position.) Apparently the only way to secure a 5½ group is: 3-6, 9, 12, 2-5, 8, 11, 1-4, thence to line through 7 to 10 switch, but the SPDT switch at unit 10, as described for eight above, will give it by: 7, 4, 11, 8, 5-2, 12. For 6½, 3-6, or 9-12, 5, 8, 11, 4, 7, 10. For 7½ use the 5½ set-up except open 7 to 10 switch. Eight and one half is easier to get than 8 for it is: 3-6, 9, 12, 5, 8, 11, 4, 7, 10, and 9 is the end in this case.

The plate showing a plain circuit for pupil exercise has increased practical value for those who wish to provide several outfits for a class. The receptacles in each row are all permanently paralleled and the ends brought straight out to brass machine screws, as shown. These bolts must be amply long to pass through the base and allow for 4 washers, 2 wires, and 3 nuts. In this, as well as the other board, the receptacles should be spaced not less than 3½ in. center to center, and it would be better if they were spaced 4 in. apart.

An additional problem is obtained by requiring the pupil to make the connections shown by dotted lines in a neat manner and substantially as indicated by the diagram. The tapped splices may be soldered and taped, as further training, or an extended U loop used instead.



A NEW LAMP-BANK CIRCUIT.

Three single units are the most which can be used in series and this and other combinations are obtained by unscrewing the unwanted lamps. The remaining groups are readily seen but for the exercise work it might be well to make up conventional diagrams of them.

These circuits are admirably adapted to the control of current by connecting the terminals marked "line" in series with the other device. It is then quite easy to increase the current by cutting in additional units one at a time, all in parallel with each other. The wide range and great flexibility of the 12-lamp outfit make it a desirable piece of apparatus for the physics department as well as for the electric shop. While the same results could be accomplished by more direct, and perhaps simplier means, this type is to be recommended because the connections are readily traced with the eye. Other special dial switches, useful where the resistance is wanted for other purposes, are invariably confused by the many cross-connectors required.

GENERAL SHOP POWER BENCH

S. L. Coover, Director of Vocational Education
Beaver Falls, Pa.

The general shop has three sets of problems each of which affects a different group of people. There is the problem of shop space and equipment facing the school administration. Since the general shop is comparatively new, it frequently happens that the space available is smaller than the space given to other shops having an equal number of students. Then there is the question of equipment. To do a variety of work one must have a variety of tools and machines. It usually happens that by the time the hand tools are bought, there is no money left to buy engine lathes, drill presses, and other large machines. Much of the success of the shop depends upon how the floor space and equipment problem is solved.

The next set of problems confronts the teacher. The teacher who has been accustomed to a well-organized one-unit shop with

CLUTCH AND SHIFTER

FOR GENERAL SHOP POWER BENCH

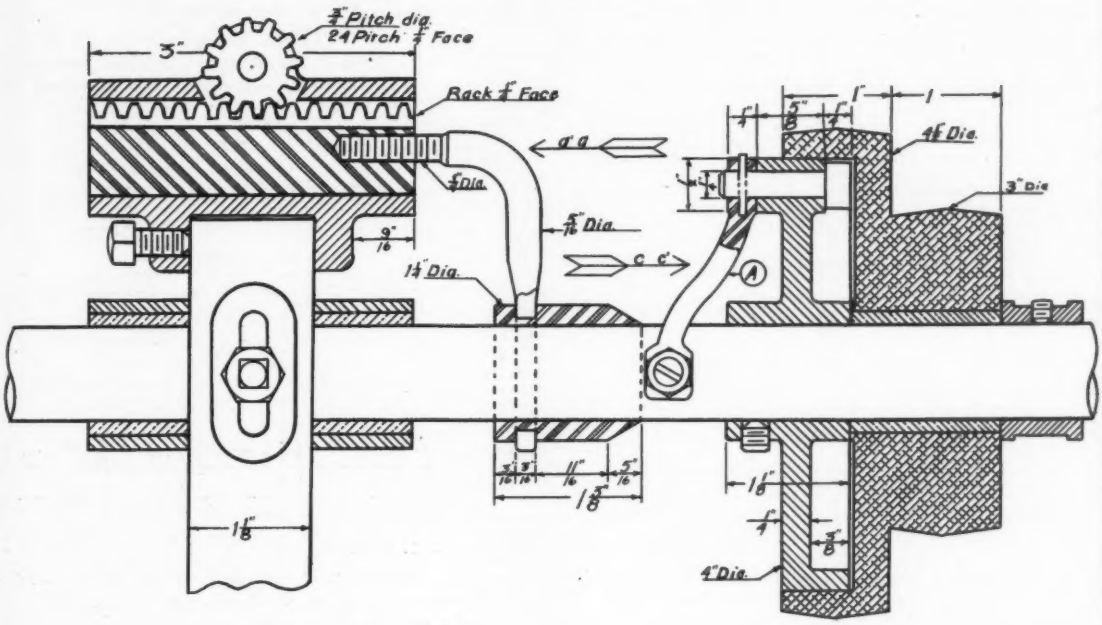


FIGURE 1.

FIGURE 2.

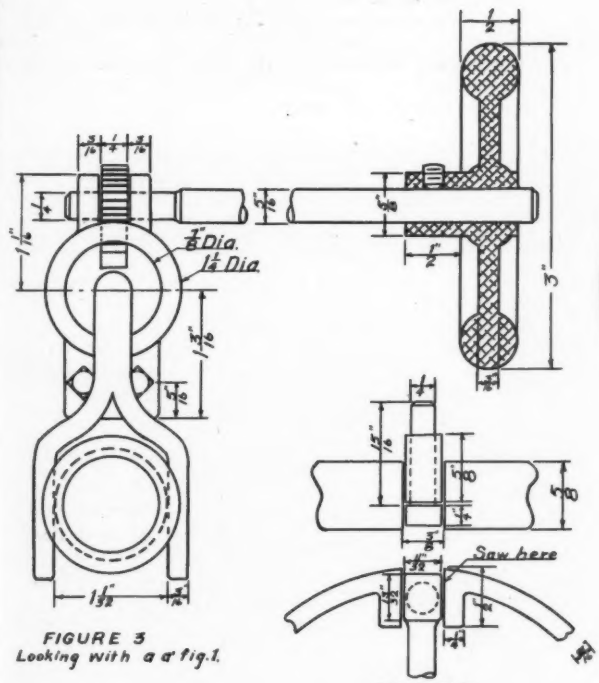


FIGURE 3
Looking with a a' fig. 1.

FIGURE 5
Detail of part H fig. 4.

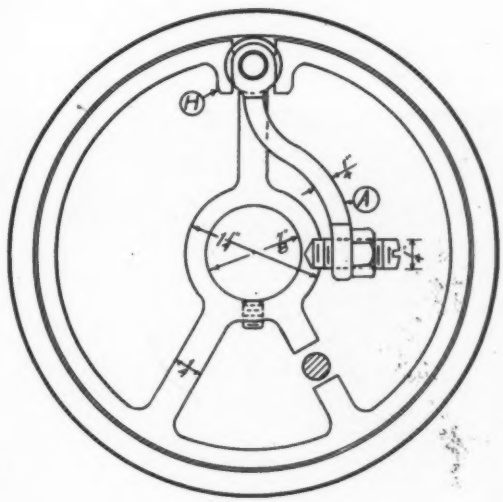


FIGURE 4.
Looking with c c' fig. 2.
The inside wheel is cast solid and then sawed as shown in fig. 5. This lets the segments of the rim from H to the spokes free to expand.

S.I.C. 7-8-27.

benches and tools enough for all of his students soon decides that he must find a new system whereby he can use the available tools, space, and equipment in the most efficient manner. He finds that the method of locating benches and machines has a direct influence on the efficiency of the shop. He realizes also that it is good shop practice to have lockers for the machine-tool accessories near the machines, and to have a place other than the bench top for the hand tools.

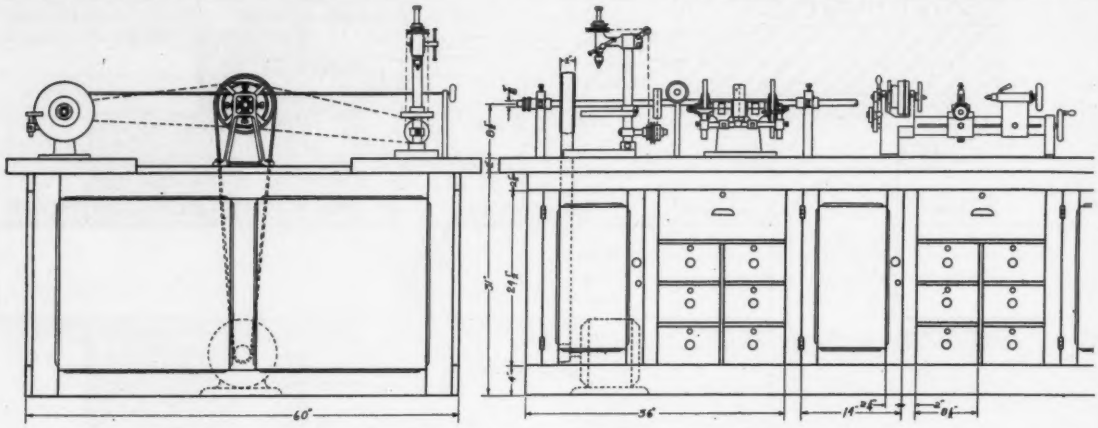
The problems which confront the student depend largely upon how the administrators and teachers have solved their respective

problems. There is a difference, however, that the boy sees these problems from a different viewpoint. The normal boy likes to work in the shop and will stick to his job until it is completed, if tools, materials, and machines are available when he needs them. But if he has to stand around and wait for any of these things, he will eventually lose interest in the job at hand. If this happens too often the boy will acquire the wrong attitude toward shopwork. A shop is a place to work. If the boy has something to do every minute he is in the shop there will be no disciplinary problems.

Not only does the boy save a vast amount of time by hav a machine ready when he needs it, but he profits also by havin chance to work on lathes and other machines for a longer pe of time than he could if the shop had only one or two large mach This widens the field of work and tends to make the whole co more interesting as well as more instructive.

The Bench

The bench shown in the illustration is 16 ft. long and 5 ft. wide, with five sections along each side. These dimensions may be



SHOP POWER BENCH DESIGNED BY S. L. COOVER.

In an attempt to solve some of the problems enumerated above we have designed and built the general shop power bench. This bench has space for ten small power-driven machines. These machines are driven by a motor located under the bench. All countershafts and loose pulleys are eliminated by the use of a special clutch and shifter both of which are shown in the accompanying illustrations. There is a large locker for supplies, and a lock drawer for machine and hand tools, under each machine. The bench has 60 lock drawers for the students' use, and yet it requires only 80 sq. ft. of floor space.

Since one boy can work at each machine, the unit cost is one tenth of the total cost of the bench.

changed so that the bench will fit the space that is available for it. The shape and size of the drawers may be changed to meet the needs of a particular shop. Yellow pine or fir 2 by 4's make suitable material for the frame of the bench. Since the line shaft and the machines are all fastened to the top of the bench it is very important to have the frame rigid enough to eliminate vibration. Two-by-four frames placed at the end of each section will make the bench stiff enough for ordinary purposes. The bench top may be made of maple, oak, or any other hardwood that may be available. Yellow pine makes suitable material for the drawer fronts and door frames. Three-ply wood may be used for the door and end panels as well as for the bottoms of the drawers.

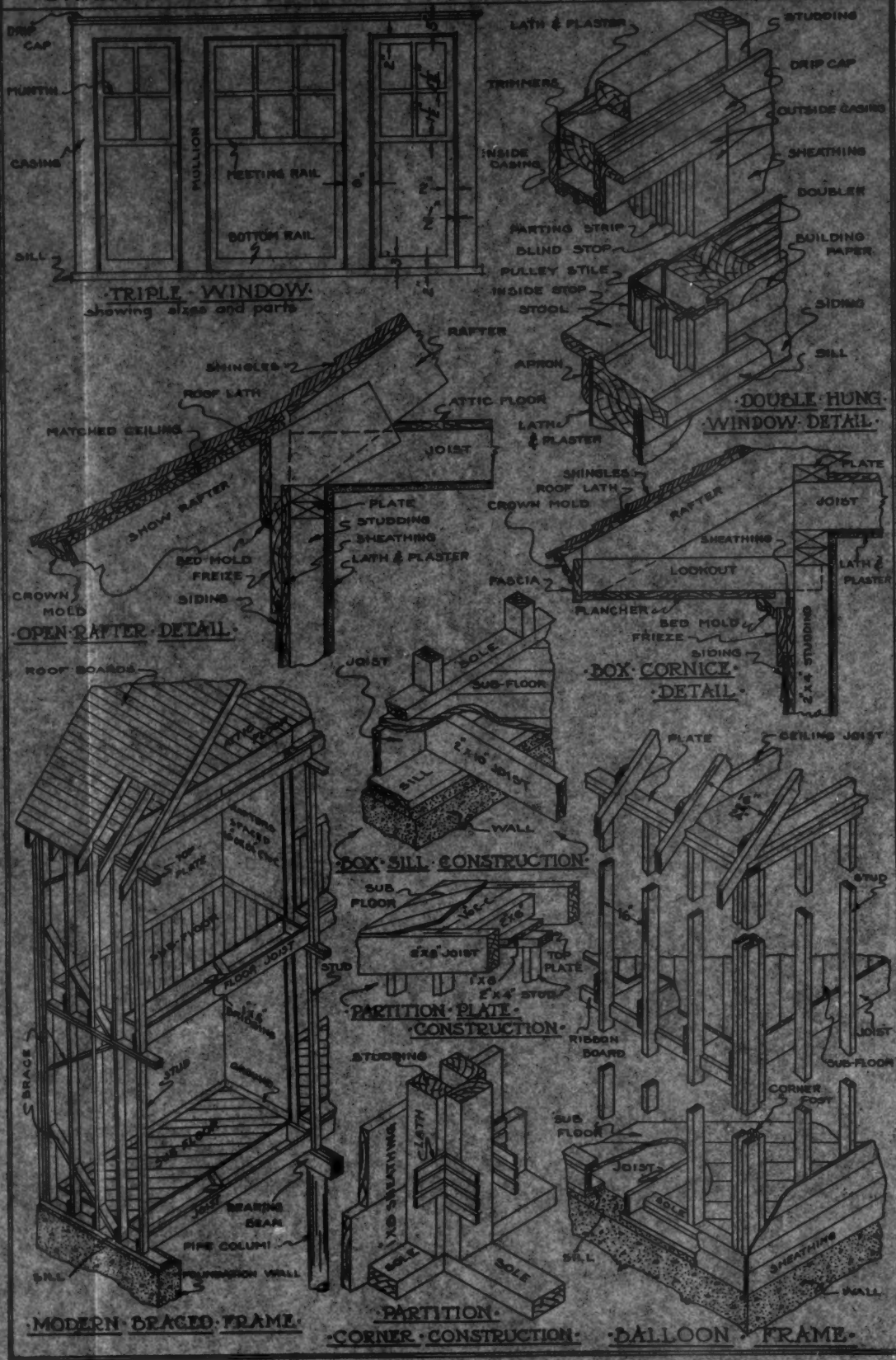
SHOP POWER BENCH.

TRACING SUPPLEMENT No. 102,
THE INDUSTRIAL-ARTS MAGAZINE,
AUGUST, 1928

To be Reprinted for School Shop Use Only
© 1928, The Bruce Publishing Co.

CHART OF TYPICAL BUILDING CONSTRUCTIONS

BY JOHN F. FABER & FAY DALEY



Designed by John F. Faber and Fay Daley, Erie, Pa.

For Description See Page 287, Industrial-Arts Magazine, August, 1928.

UNIV OF

The Clutch and Shifter

The clutch and shifter illustrated on page 283 are unusually compact. They were designed to meet the exacting requirements of the general shop power bench. The shifter is fastened to the shaft hanger by means of two setscrews. It may be fastened either on top or along the side of the hanger. The one illustrated was designed for the top of the hanger. Where two shifters are placed on a single hanger it is more convenient to have them placed on the side of the hanger. The shifter which fastens to the side of the hanger is like the one shown in the illustration, with the exception that the fastening lugs are placed at right angles to the position of those shown in Figures 1 and 3. A special bracket, not shown in the illustration, of the same width and height as the hanger, can be used as a base for the shifter where the hanger is not conveniently located or where more than two machines are placed between hangers. These same brackets are used to support the rod with the hand wheel as shown in Figure 6.

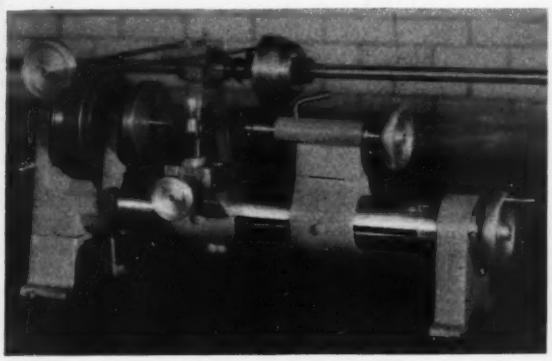


FIG. 6. ENGINE LATHE, 5 x 12" CAPACITY.

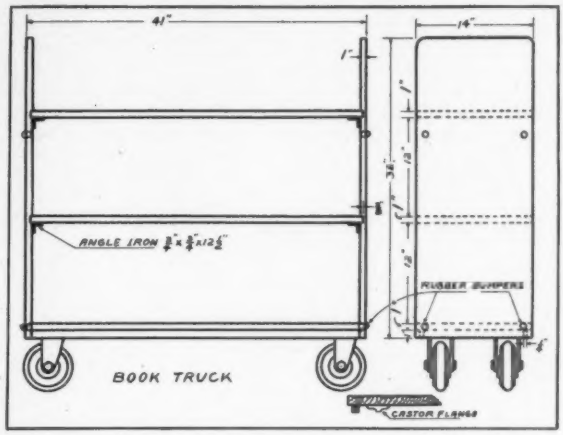
The casting shown in the cross section, Figure 1, is made from a 2-piece pattern. It is cored ¾ in., bored to .872 in. and then reamed to ⅞ in. A ¼-in. hole is drilled for the shaft and the two holes are drilled and tapped for ¼ by ½-in. setscrews. The moving part is made of ⅞-in. diameter C.R.S. It has a ¼-in. slot milled the entire length for the rack. The forked shifter rod is forged out of $\frac{5}{16}$-in. diameter steel and may be made any length depending upon the distance between the clutch and the hanger. The collar with the tapered end is made of C.R.S. The inside wheel of the clutch with the expanding rim is made of cast iron. The ⅞-in. hole through the center is first bored to size and the wheel is then placed on an arbor, turned to size and polished. The ¼-in. hole is drilled and the rim is then sawed as shown in Figures 4 and 5. The loose cone pulley may be made of aluminum or cast iron with a bronze bearing. There should be approximately .005 in. clearance between the expanding rim and the loose pulley. The loose pulley may be made any size and shape to meet the requirements. The cone pulley as shown is very satisfactory for small lathes and drill presses, but grinders and other high-speed machines require larger pulleys. The revolving arm A, Figures 2 and 4, is made of steel stock $\frac{5}{16}$ in. in diameter, and 2⅜ in. long. It is turned to ¼ in. in the center leaving it $\frac{5}{16}$ in. in diameter for a distance of ½ in. at each end. The ends are flattened until they are ¼ in. thick. One end is drilled and reamed ¼ in., the other end is drilled $\frac{5}{16}$ in. and tapped ¼ in. The shifter rod is made of stock $\frac{5}{16}$ in. in diameter turned to ¼ in. at the one end to fit the spur gear and bearings in the shifter casting. The hand wheel is aluminum with the entire surface machined and polished.

LIBRARY TRUCK

Harry Cameron, High School, Appleton, Wis.

Our library was considering the purchase of a new book truck, but the manual-arts department was given the chance to bid on the job and received the contract.

The accompanying drawing gives the details of the project. We used 1¼ by 8-in. quarter-sawed white oak to build up the shelves and ends, and this was surfaced to 1 in. after gluing. The ends were dadoed to receive the shelves, and angle iron was used to reinforce corners and joints. This made a very sturdy truck, one which has withstood the rough usage that a library truck is subjected to. The rubber-tire wheels screw into ¾-in. pipe flanges.



The white oak we used had considerable sapwood, but this was touched up with a weak solution of golden-oak stain which matched up well. The job was finished with satin-finish lacquer and the result was quite gratifying.

LIBRARY TRUCK.

Two of our senior students undertook this contract, and received all the thrills of undertaking a job and seeing it through.

BENDING TUBING

C. C. Hermann, Moline, Illinois

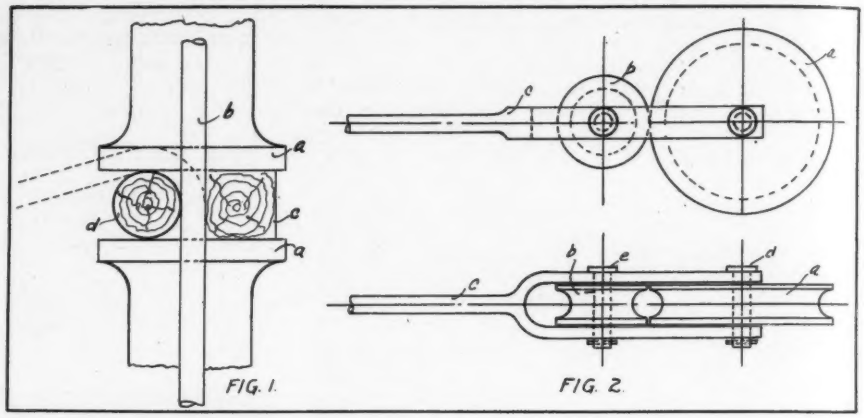
One of the most difficult tasks confronting the man who undertakes odd jobs is the bending of hollow rounds, tubing, and pipe. The wall just will not stand up. They cave in, bend out of shape, and result in a very poor job, one that the workman would be keenly ashamed of. There is really little to be feared, however, when the correct procedure is followed.

In the event that brass or sopper tubing is used, the first thing to be done is to anneal it. This initial step reduces the metal to a ductile state, so that the smaller sizes actually may be bent by hand. To anneal brass or copper tubing, heat it in an even temperature to a dull-red heat. Then plunge the tubing into cold water. To obtain an even temperature during the heating does not mean heating it with a blowtorch out in the open. The best way is to heat is in a closed furnace. However, such a furnace is not always handy, then the next best thing is to heat the tubing in a blacksmith forge, being careful to avoid a direct blast of air on the metal.

The method to be used in bending the tubing depends upon the size of the tubing. The method also depends upon the radius to which the tubing must be bent. The larger the radius the

easier the bend will be. For a comparatively small radius on pipe up to ¾ in. nominal size, all that is needed is a bench vise and two blocks of wood. One of the blocks must be of the same radius as that of the bent pipe taking the measurement from the inside of the bend. Figure 1 will assist in understanding this. The vise is shown having jaws *aa*. A square wood block *c* is held in the jaws of the vise spaced a distance equal to the diameter of the pipe *b* from the round block *d*. The pipe *b* is placed between the two blocks and bent around the round block *d*, to the proper angle. Before placing the pipe between the two blocks for bending, it is marked at the center of the bend or at the two extremes of the bend. This facilitates bending the pipe at the correct place.

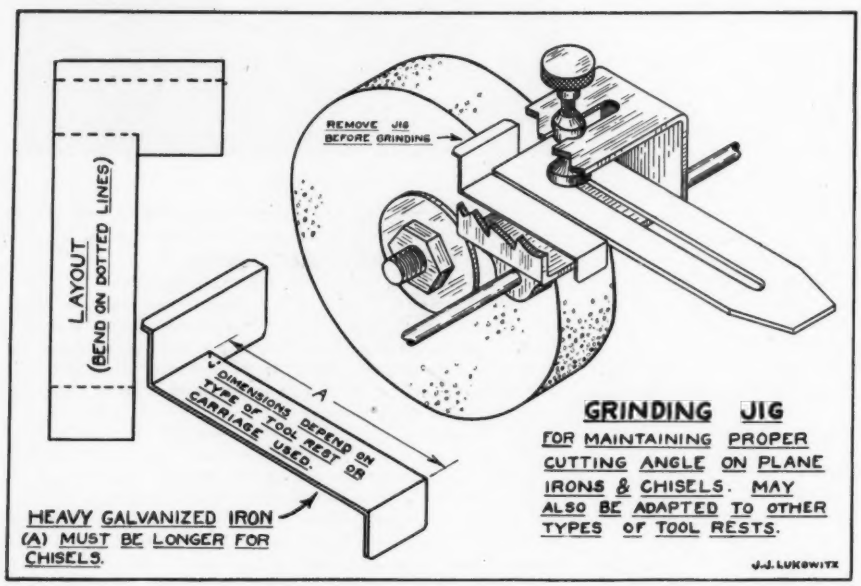
Except where the pipe is bent through an angle greater than 180 deg., the wood block *d* may be grooved. The groove must have the same radius as the outside radius of the pipe. Where the angle of bend is greater than 180 deg. it may be difficult to remove the bent pipe from the wood block. In this case a round steel pin is used instead of the round block of wood.



TUBE BENDING DEVICE DESIGNED BY C. C. HERMANN.

To avoid the usual flattened side and short kink at the bend, it is advisable to fill the pipe with some fine substance which will give freely during the bending. Such substances as sand, lead, or water may be used. Where the pipe has threaded ends it may be filled with water and a pipe cap screwed on the ends. The pipe may then be bent without fear of kinking or flattening it. In the event of using lead, the pipe is filled with sand up to within a few inches of the lower end of the bend. Then lead is poured into the pipe until the section covered by the bend is filled. As soon as the lead has hardened the pipe may be bent. The lead is then melted out by heating the pipe. The ends of the pipe also may be plugged, and the pipe filled with sand, before the bend is made.

For bending pipe that is larger than ¾ in. nominal size, the bending machine shown in Figure 2 may be utilized to advantage.


LAYOUT
(BEND ON DOTTED LINES)
REMOVE JIG BEFORE GRINDING
A
* DIMENSIONS DEPEND ON TYPE OF TOOL REST OR CARRIAGE USED.
HEAVY GALVANIZED IRON
(A) MUST BE LONGER FOR CHISELS.
GRINDING JIG
FOR MAINTAINING PROPER CUTTING ANGLE ON PLANE IRONS & CHISELS. MAY ALSO BE ADAPTED TO OTHER TYPES OF TOOL RESTS.
J.J. LUKOWITZ

This machine, which is simple and rugged, may be readily made. The large wheel *a* is made with a radius that is from $\frac{1}{32}$ in. to $\frac{1}{16}$ in. smaller than the radius of the pipe after bending in order to provide for spring back. The wheel *b* is made comparatively small but large enough to incorporate sufficient strength to stand the heavy work placed upon it in bending. These wheels are both provided with a groove equal to the diameter of the pipe to be bent and the depth equal to one half the diameter less $\frac{1}{32}$ in. This helps to hold the pipe snugly while bending and thus prevents kinking. The two wheels are held in the fork *c* by pins *d* and *e*.

The device must be held in some substantial manner during the bending. For instance, the large wheel pin may be clamped in a vise. If this is the plan to be followed, the pin must be keyed to the wheel. Another method is to bolt a special clamp on the wheel. In either method care must be taken to have proper clearance for the lever to swing the pipe through the desired angle in order to obtain the desired degree of bend. Should a clamp be used, it may be made to serve both as a means for holding the device and for marking the beginning of the bend on the work. In this case the clamp must be made long enough to project beyond the pipe and a second clamp is placed on the pipe to locate it in the device.

GRINDING JIG

Jos. J. Lukowitz, Milwaukee, Wis.

Some time ago the author made this device to overcome the difficulty the boys had with grinding plane irons and chisels to the proper angle. When a number of tools are to be sharpened at one time, this device is especially helpful in maintaining the correct angle on all. The device may seem awkward at first, but it will soon prove to be exceedingly simple in use, and even the boy who cannot seem to sense the correct angle will have no difficulty whatever in grinding any number of plane irons or chisels to the correct angle. Furthermore, he will do it in much less time than if he had to depend on his sight and judgment.

Of course, the boys should be taught to grind tools without this jig, but it is also of great value to them to have the experience of doing the job with the help of this device. Time- and labor-saving methods are used a great deal in industry and they should not be excluded from schoolwork after certain fundamentals are mastered. It would be of great value to boys if, as a result of their school-shop contact, they were made appreciative of labor-saving devices or devices which would help to attain accuracy or more rapid duplication of parts.

Eventually, most boys will come into contact with all kinds of jigs and fixtures in industrial or commercial life, and it is reasonable to assume that they may the more intelligently and profitably

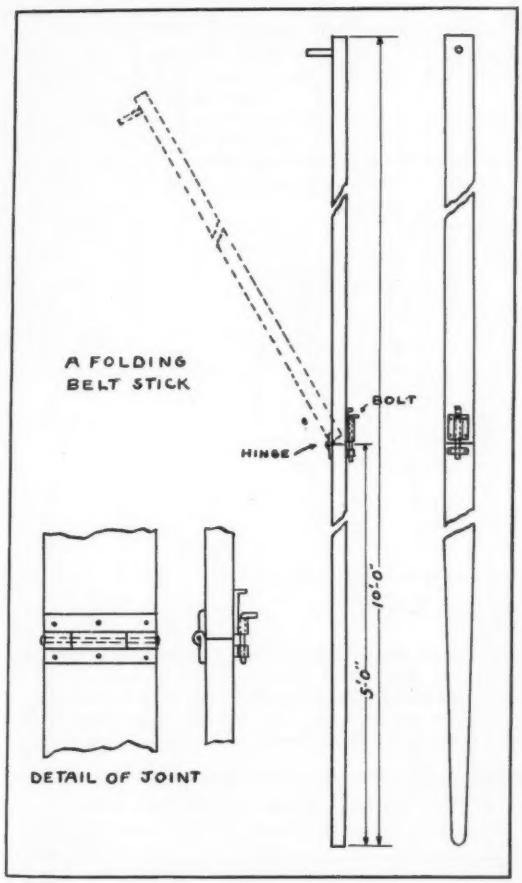
use and appreciate them when occasion arises if they have had some previous school experience along this line.

The author and editors of the INDUSTRIAL-ARTS MAGAZINE believe that if the readers of the magazine contributed more of the shop kinks which they have devised, a great deal of good will be derived by all who are engaged in the industrial-arts field. They therefore invite all to make their special devices available to their coworkers and thus to contribute to the advancement of the common cause.

A FOLDING BELT STICK

W. Kendall, Hamilton, Ont., Canada

Most machine shops carry one or more belt sticks as part of their equipment. Usually this is just a stick of wood with a stud at one end so that belts can be knocked off or placed on pulleys without using a ladder. It is a simple tool, and answers the purpose, but it is an awkward thing to carry around a crowded machine shop. There is too much danger of having it caught by some moving mechanism or by a running belt. Fortunately, it is a simple matter to reduce a 10-ft. belt stick to half its length and thus make it easier to carry around. Saw the stick into halves as shown in the sketch. Join the halves together again with a hinge, and on the opposite side place an ordinary door bolt.

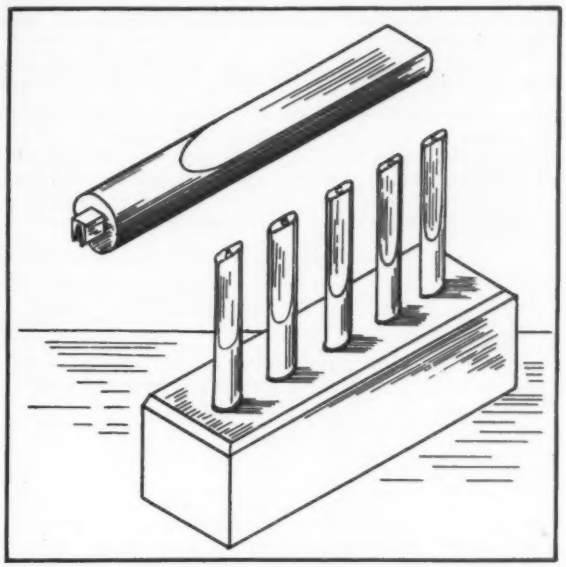


It will be seen that when the bolt is pushed downward, the stick presents a solid 10-ft. length. By withdrawing the bolt, the stick can be folded together and safely carried to any part of the shop.

SHOP-MADE MARKING STAMPS

Howard W. Boekeloo, Central High School
Kalamazoo, Mich.

The average teacher's classbook or card index, neat as it may at first appear with typed or lettered students' names, generally becomes quite soiled and mussed up through the use of a pencil for placing marks. Though with each new semester the teacher resolves that each mark will be put on with the fountain pen, the pencil invariably slips in. Usually, too, it is a pencil with a hard lead at that.



MARKING STAMPS.

A set of stamps for the drafting room has solved the problem for the writer. These are used on both the drawing and the record sheet at the same time. The stamps can be purchased in the form of a small printing outfit for 10 or 15 cents at most 5 and 10 cent stores. A piece of dowel rod about 3 in. long is flattened on two sides to facilitate handling and glue sized on the opposite end. Another coat of glue is applied and the rubber type for A, B, C, D, and E or any other system of marks is set in the glue. A neat block with openings drilled out for the dowel rods may be used to hold the completed stamps.

A GREASING RACK

N. D. Stutzman, Bakersfield, Calif.

The accompanying illustration shows a utility rack which is in use outside of the auto shop for greasing, and light repairing of automobiles.

Crowded conditions made this useful project necessary. It also proved to be a very educational project for the evening-school students of the oxy-acetylene-welding class, who cut and welded the pipe.

GREASING RACK.

The guard rails and frame are made of 2-in. pipe, and the bracing is 1-in. pipe. All joints are welded, and 3 by 10-in. boards are used for the runway.

The rack is 30 ft. long over all. It affords ample room for any car, and is safer than many racks on the market.

The cost of construction is as follows:

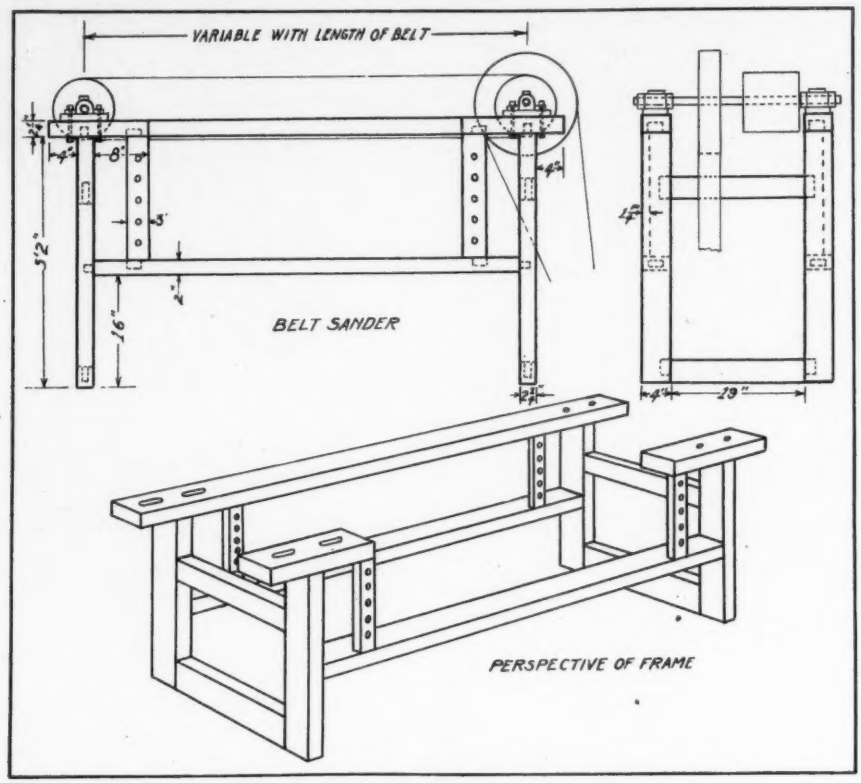
2-in. and 1-in. used iron pipe	$26.01
4 boards 3 by 10 by 16 ft. long	12.00
Oxygen and acetlyene	21.10
Filler rods for welding, (approximately)	5.00
Total	$64.11

THE BELT SANDER

Leon A. Orr, Principal, Junior High School
Bennington, Vermont

We had long felt the need of a sander in our high-school manual-training shop and finally constructed one that was quite inexpensive.

The accompanying illustrations show how it was constructed. The frame was mortised together and fastened with bolts. The pulleys, shafting, and bearings were all obtained at a secondhand store. The material which we used has proved rigid enough for all purposes. At the present time we are using sand belts discarded by a manufacturing plant, picking out those that are worn the least, we find them very satisfactory, but new belts can be purchased at a nominal figure and will wear a surprisingly long time.



BELT SANDER DESIGNED BY LEON A. ORR,
BENNINGTON, VERMONT

The uprights with the row of holes are for supporting a table which is not shown in the drawing. This table is used to hold the work against the underside of the belt and can be raised or lowered as the thickness of the work demands. The belt, as it revolves, is pressed down upon the work with a little square block having a handle attached to it. The sand belt passing over the end pulley makes an ideal drum sander for curved surfaces. We found it unnecessary to cover the surfaces of the flat steel pulleys, as they had a grip firm enough to pull the belt. Our belts are 8 in. wide and we used two flat steel pulleys 4 in. wide at each end.

The long slots at one end of the top of the frame are for keeping the belt tight by moving the whole of that end of the pulley and shaft assembly along the frame.

The speed of the belt is best at about 450 r.p.m.

A SHOP-MADE EMERY-WHEEL DRESSER

S. S. Sutherland, Iowa State College, Ames, Iowa

A few years ago, while teaching farm shopwork in a small consolidated school, I learned a shop kink from an old Norwegian carpenter, that may be of value to other teachers of shop courses.

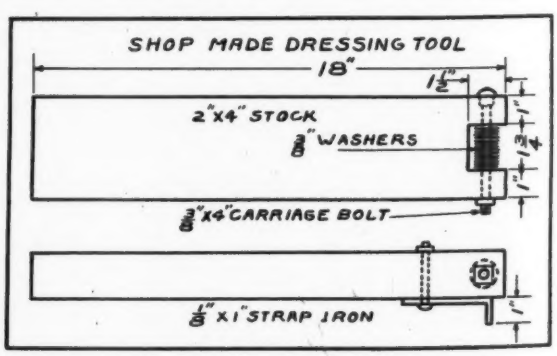
Our shop emery wheel, after about six months' use, was in terrible condition. It looked more like a cam than a wheel. The face was grooved, and so coated and glazed that grinding anything thereon was *labor*. Anything approaching a decent job of grinding with it was impossible.

This carpenter, who was our school janitor, had occasion to use the grinder one day, and (as janitors are wont to do) commented on its woeful condition. I told him that I realized it left quite a bit to be desired, but that we had no dressing tools because the school board viewed any additional expense for equipment with alarm, and so there it was.

"Vell, you yust—." The gist of what he said I'll pass on with the hope that it may help other shop teachers solve this common problem.

A simple, efficient dressing tool for emery wheels can be made in your own shop out of materials readily available, if not in the shop, at the local hardware store for a cost of, say, a nickle.

Take a piece of scrap 2 by 4 about 18 in. long, notch it as shown in the accompanying sketch, making the cut a trifle wider than



the width of the wheel to be dressed. Bore a ⅜-in. hole through the two projections ¾ in. from the end of the stick, and insert a ⅜-in. bolt, threading as many washers on the bolt between the projecting ends as possible. Screw a nut on the end of the bolt, and your wheel dresser is ready for use. The washers may be hardened by heating them to a dark-red heat and plunging them into water, but the danger of their breaking while in use is liable to offset the greater resistance to wear secured.

In order to true the wheel, the dressing tool must be held securely or it will follow the contour of the wheel and leave it as far out of round as before. It may be advisable to bend a couple of pieces of strap iron and bolt them to the bottom of the 2 by 4 to form hooks to catch the edge of the rest and hold the tool steady.

I have used this type of dresser for truing and sharpening emery wheels ranging in size and speed from a little 4-in. hand-power bench grinder to an 18-in. high-speed motor-driven wheel 2 in. in width, and actually prefer it to a regular dressing tool, especially for larger wheels.

A STAND FOR PROJECTION PROBLEMS

Wilfrid Bowdler Elyria, Ohio

The stand shown in the accompanying illustration was designed to overcome the difficulty of holding models in their proper position, while studying drawing.

Formerly the method of holding them was by propping them up with erasers, or any other available material. This usually interfered with the view of the under surface, especially when the model was tipped away from the observer.

The stand is composed of a base holding a revolving stem, on which is a table that can be tipped. In the center of the table is the male half of a master dowel pin, and the female part is fastened in a wooden model in the usual manner, or soldered to a sheet-metal model.

By making the first revolution on the table, and subsequent revolutions by means of the stem, and tipping to right or left as required, many combinations can be worked out. As the table is narrow it does not interfere with the view of the base.

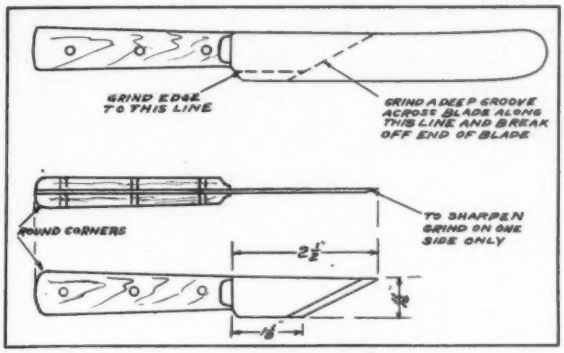
This stand has been used to great advantage with a glass projection box; and by covering the glass with a piece of card, with a hole in the center, about ½ in. in diameter, through which the student looks, thus keeping the model out of perspective, and confining the attention to those surfaces which he is supposed to see.

The stand makes a very good problem for the machine shop as it involves laying out work, turning, knurling, milling, shaping, drilling, tapping, filing and fitting.

REPLACING BENCH KNIVES

Russell E. Norris, Union-Endicott High School Endicott, New York

Bench knives have the property of vanishing from the woodshop more quickly perhaps than any other small tool that can find its way into a boy's pocket. When there are many boys in a woodworking class that have the collective instinct developed to an abnormal degree, it soon becomes necessary to replenish the supply.


GRIND EDGE TO THIS LINE
GRIND A DEEP GROOVE ACROSS BLADE ALONG THIS LINE AND BREAK OFF END OF BLADE
ROUND CORNERS
TO SHARPEN GRIND ON ONE SIDE ONLY
2½"

A HOMEMADE BENCH KNIFE.

A very good and serviceable bench knife can be easily made from an ordinary wooden-handled kitchen knife. The 5 and 10 cent stores stock these knives and the quality of the steel is surprisingly satisfactory.

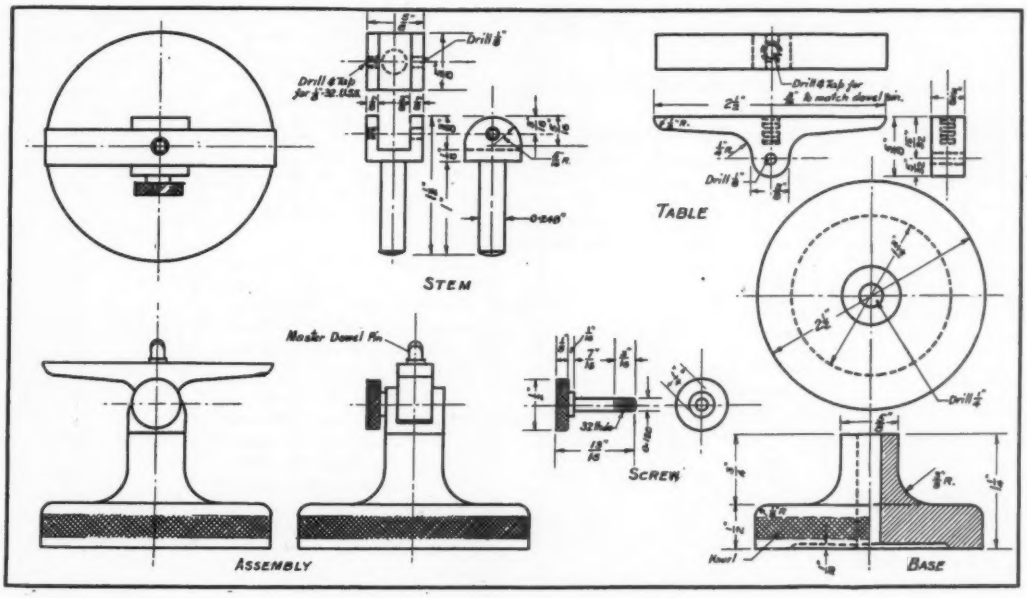
These knives may also be used as a project for the boy who is interested in making up a home tool kit. By grinding the blade on one side it allows the blade to follow a straight edge more closely in doing layout work.

DRYING RACKS FOR THE PRINTSHOP

W. W. White, Huntington, Indiana

Drying racks are indispensable in the printshop. They are so easy to make and cost so little that there is no excuse for not having a good supply on hand. The dryers shown on page 290 provide a good project for the woodworking class.

If a bench saw is available, the style shown in the detail (Fig. 1) is the best. The rail is made of 2 by 4-in. softwood ripped and dressed to 1¼ by 1¾ in. The length of the rail and slat is determined by the size of the presses these dryers are to serve. The author

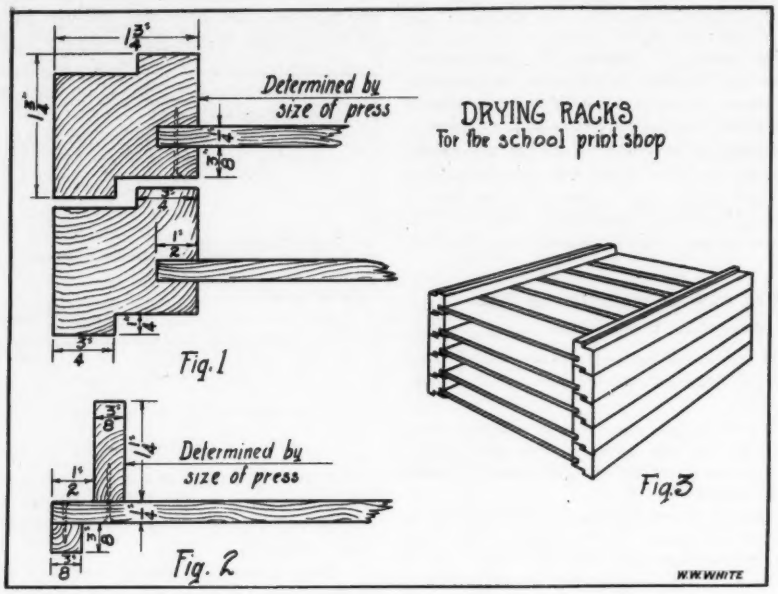


STAND FOR PROJECTION PROBLEMS.

once thought a solid floor for each dryer best, but found since, that a slatted floor provides a better circulation of air, and also permits the stock to be removed more easily.

Although not quite as attractive, dryers constructed like the detail in Figure 2 are just as serviceable as those shown in Figure 1, and can be made by anyone with a saw, plane, and hammer. The author now has a set of these which were made from the crates in which paper stock had been shipped.

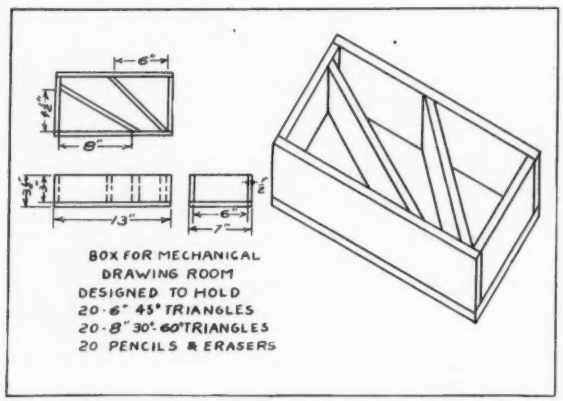
Figure 3 shows a stack of dryers of the first style. The use of these dyers promotes care and pride in a neat job in the student, and also provides a means by which the instructor may more accurately check the different runs or parts of runs. If the dryers are numbered the pressman may indicate on his report exactly what material he is responsible for.



CONTAINER FOR TRIANGLES, PENCILS, AND ERASERS

Ralph P. Hummel, High School, Washington, Pa.

For some time I had thought that there must be some way in which to properly care for triangles, erasers, and pencils in my drawing classes.



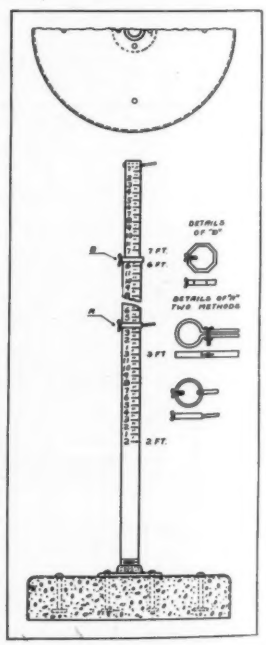
The illustration shows just how I solved the difficulty. The container is constructed to take care of a class of twenty students. It is made for 6-in. 45-deg., and 8-in. 30-60-deg. triangles. The box can be constructed so that other instruments, such as scales, can be cared for.

Since I made this container, I have more room in my drawing cabinet, my triangles, pencils, and erasers are kept in one place, and the passing and collecting of these pieces of drawing-room equipment and supplies, is much facilitated.

JUMPING STAND

R. B. Farr, South Junior High School
Everett, Washington

The base of the jumping stand described herewith was made from a brake drum of an old Essex car. These drums are 3 in. high and 14 in. in diameter. To the top of the brake drum a 1¼-in. floor flange is bolted, into which a piece of 1¼-in. pipe 6 ft. long is screwed. A piece of 1-in. pipe 6 ft. long is placed within the 1¼-in. pipe. The one end of the 1-in. pipe is drilled for a ¼-in. bolt which projects far enough beyond the pipe to act as a support for the pole.



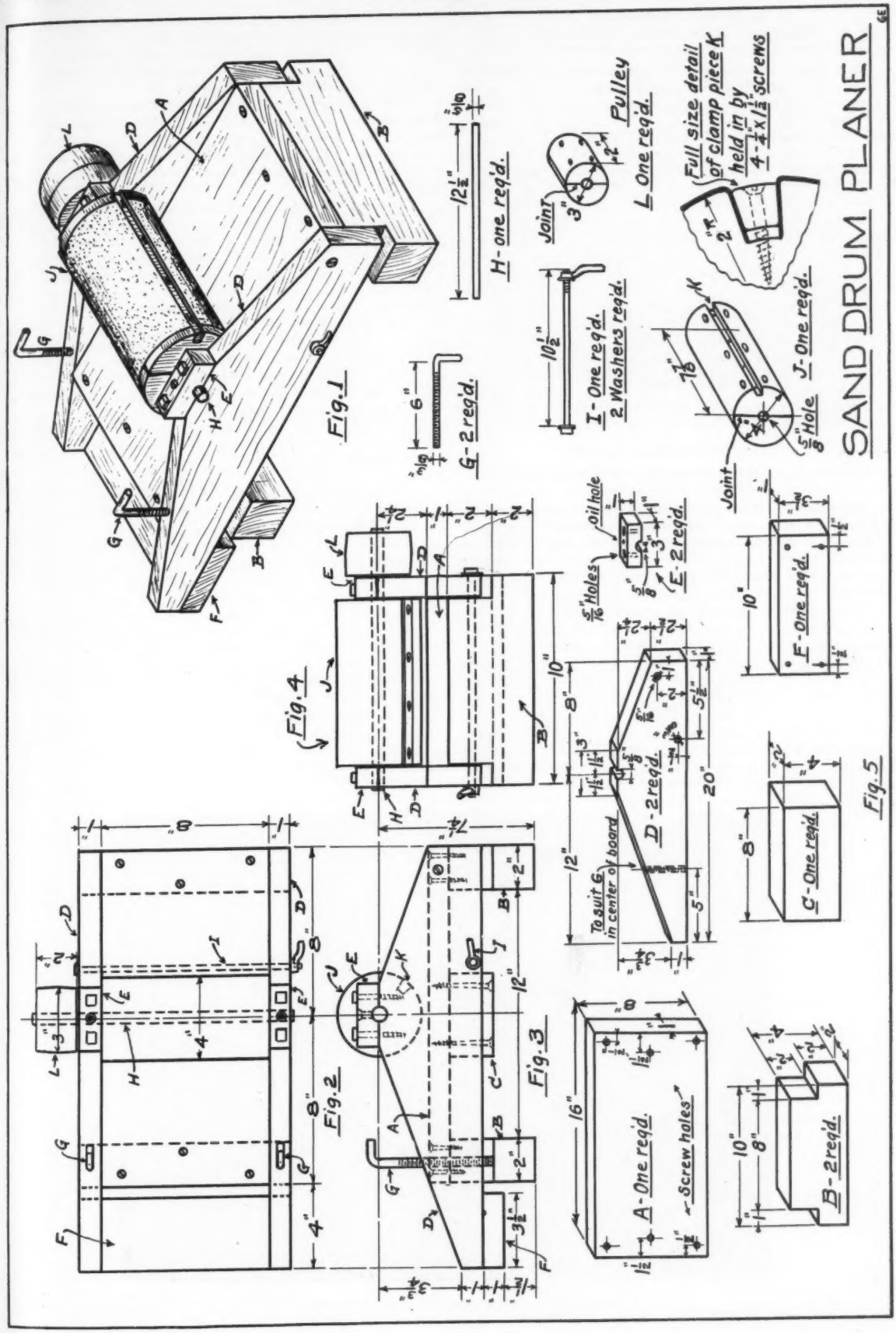
Since 11 ft. is about the highest a boy will vault, the 12 ft. which this jumping stand allows, is sufficient.

It is best to use galvanized pipe as this will not rust as quick as black-iron pipe. However, if galvanized pipe is not available, black-iron pipe that is painted may be used.

The inch and foot marks can be indicated on the pipes with a cold chisel, and the numbers are stamped on with steel numbering dies. One-fourth-inch numbers may be used for the foot marks and ⅛-in. numbers for the inch marks. After the inch marks and the numbers have been stamped into the pipe, red lead may be rubbed into them to make them more visible.

The clamps for the 1-in. and 1¼-in. pipes may be made by following the suggestions shown in the illustration.

In order to increase the weight of the jumping-stand base, the brake drum should be filled with a 3-to-1 concrete mixture.


SAND DRUM PLANER
Fig. 1
Fig. 2
Fig. 3
Fig. 4
Fig. 5
A - One req'd.
B - 2 req'd.
C - One req'd.
D - 2 req'd.
E - 2 req'd.
F - One req'd.
G - 2 req'd.
H - one req'd.
I - One req'd.
2 Washers req'd.
J - One req'd.
K
L One req'd.
Pulley
Joint
Full size detail of clamp piece K held in by 4 - 1/4 x 1 1/2 screws
Screw holes
Oil hole
To suit G in center of board

SAND-DRUM PLANER

Walter D. Emerson, Norwich University
Northfield, Vermont

Every model maker has use for a planer to size up small pieces of wood. The ordinary planer is too large and too expensive, the common sand drum does not produce straight, even pieces, and the hand plane is very unsatisfactory. The sand-drum planer described herewith will, however, quickly sand small pieces true to size.

Figure 1 shows the complete machine ready for use. The parts are lettered to correspond with the letters on the other figures. Figures 2, 3, and 4 show the projections of the assembled machine. In these drawings, A represents the table of the machine. This should be perfectly flat on top. B represents a support, C is a stiffening piece, D the frame and support for the sand drum J, E is the bearing cap, G is the adjusting screw, I is a clamping screw, and L is the pulley. Although the details are shown in separate views, the dimensions should be taken only as suggestions and any dimension may be changed to meet the needs of the builder.

Figure 5 shows the details of the parts of the sand-drum planer. A is made of a hardwood board as near 1 in. thick as can be found, although the thickness is not as important as its stiffness. It must not spring down when sanding a piece. The top surface must be planed smooth and true. The six screw holes should be drilled for about 2-in. screws. They should be countersunk so that the screws will not be in the way when using the machine.

A COMPACT TOOL CABINET

Gordon H. Higgins, Industrial-Education Department
Buffalo, New York

Hand tools for a woodwork shop large enough to accommodate fifty boys and two teachers can be stored in 36 cu. ft. of space. A cabinet of this size, designed by John F. Reid of Peckham Vocational School, Buffalo, N. Y., affords ample room for the numerous planes, chisels, bits, braces, saws, and other tools needed in teaching the woodworking trades.

The tool cabinet is housed in 3 sections. Each of these sections is of two parts—a lower and an upper. A ledge 6 in. wide projects over the lower sections, and forms a convenient shelf.

The lower parts, each 3 ft. high, 3 ft. wide, and 24 in. deep, are fitted with shelves and used as storage space for hardware and supplies while the upper parts, each 4 ft. high, 3 ft. wide and 18 in. deep are used to store all hand tools.

It is the ingenious design of these divisions which is of special interest to shop teachers and shop foremen. The illustration shown herewith gives an idea of the appearance of the cabinets, but it cannot reveal the clever arrangement of doors within the cabinets. These doors, hung with ample clearance space between, give a large surface on which to hang hand tools.

Section 1 has two single-paneled doors and the inner space is divided by shelves and is used to store extra tools, hardware, and shop materials which cannot be hung up.

The upper part of Section 2 has one double-paneled door, the inside of which is used as a tool rack for chisels, rasps, and screw drivers. The front of an inner door is used as a tool rack for steel squares, bits, bit gauges, scrapers, etc. Shelves under this inner door furnish space for 24 planes, 12 oilstones, and miscellaneous extra tools.

The upper part of Section 3 has one double-paneled outer door, the inside of which accommodates hammers, marking gauges, bench cabinet scrapers, router planes and hand drills. Between the outer and inner doors there is a 9-in. clearance, permitting the front of the second door to take care of a saw rack for 7 handsaws, 8 backsaws and 8 try-squares, 2 racks each holding 4 braces and 11 other special saws, with space for 12 planes below.

The inside of the second door is also used for a tool rack and both sides of a third door are used for tool racks. The back of the cabinet furnishes additional room for hanging tools.

With the tools hung on the swinging doors, a stockroom keeper or a teacher can see at a glance what is missing. All tools can be kept in place and quickly located when needed.

This tool cabinet has proved the most convenient arrangement for storing tools that has been found in eighteen years of school-shop management.

ARCHITECTURAL DRAWING CHECKING LIST

L. N. Cilley, Gorham Normal School, Gorham, Maine

In advanced architectural drawing, each student is working on an individual set of plans including the necessary floor plans, elevations, etc. Before beginning his layout, he has looked over all the materials which the instructor can furnish. This includes a number of textbooks, catalogs, newspaper and magazine cuts, pamphlets, blue prints, single-line sketches, and pictures. Besides this, the boy is urged to collect sketches, cuts, and material from newspapers and magazines. He embodies all the good points that he can collect from the various sources, in his plan. This requires considerable time, and the instructor finds it difficult to check each pupil's drawing as thoroughly as it should be.

With this in mind, the following checking list was devised to allow the student to check his own personal sheets for missing items, dimensions, and notes. It should acquaint the student at the same time with a definite list of necessary items that are required on each job, along with a knowledge of building terms and names. Some-

TOOL CABINET DESIGNED BY GORDON H. HIGGINS.

times it might be advisable to have one student check the drawings made by another. This can be readily done by using the checking list to find all the omissions and mistakes. It is also an aid to the instructor as it will save him much valuable time in checking drawings and prevents the overlooking of important items which go to make the drawing complete.

Checking List

First Floor Plan

Walls—Outside dimensions of main sills or outside of wall studs. Shading.
Partitions—Detail dimensions from outside corner to center line, and to other centers.
Windows—Detail dimensions from outside corner to center, and to other centers, swing, size, and number of lights. Avoid repetition of dimensions by use of a NOTE.
Doors—Detail dimensions from outside corner to center line, and to other centers or from center of a partition to center line, and to other centers. Swing, three dimensions. Print note to avoid repetition of dimensions.
Stairs—Broken line to show stairs underneath, arrows showing direction, posts, and railings. Note for rise and run, number of treads and risers and their widths.
Chimneys and Flues—Two dimensions.
Heating Plant—Convention for registers.
Fireplace—Convention, two dimensions. Flue, tile.
Electric Light Wiring—Conventions for fixtures, switches. Wall. floor, special, and line of wiring.
Porches and Sun Parlors—Columns, railings, steps, two dimensions.
Built-in Articles—Name; doors, swing, and three dimensions, windows, swing, size.
Rooms—Name, inside dimensions from inside of wall studs.
Plan—Name, scale, architect's name. Compass points.

Second Floor Plan

Repeat all above except these changes and with these additional items:
Porches and Sun Parlors—Show roof outline.
Extra flues in fireplace chimney.
Bathroom—Show placing of the various fixtures by using proper conventions.

Cellar Plan

Walls—Outside dimensions (same as house or 2 in. more). Shading as to kind of material, dimensions of thickness.
Windows—Detail dimensions. Size and number of lights. Bulkhead windows.
Doors—Detail dimensions, swing, three dimensions. Bulkhead and stairs.
Stairs—Post and railing, note for rise, run, number of treads and risers and their widths.
Chimney—Flue opening, large footing.
Furnace—Place by drawing convention. Show pipe to chimney.
Note: Kind of heating plant and dimensions of placement.
Piers or Concrete Footings—Dimensions of placement to their centers and note as to dimensions.

Elevations

Line of heights in section, showing cellar floor, wall, and window, sills, flooring, window; second floor, window, cornice, and roof in section. State the pitch of roof in a note.

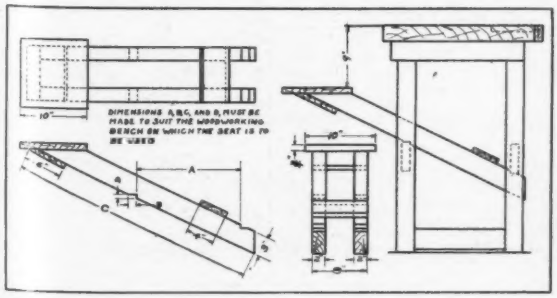
Points on each Elevation

Cellar wall (kind of material).
Cellar windows.
Cement terraces, porches, etc.
Water table.
Corner boards.
Clapboards (narrow or wide) or shingles.
Doors: casings (side and head) stool, panels, etc.
Windows: casings (side and head) stool, frame, and number of lights.
Cornice: closed-up appearance, returns, finished molding, gutters, shingles.
Roof: shingles on surface, ridge roll or shingles, saddleboards.
Chimneys: brick, design at top.
Piazza: cornice, posts and caps, railings (open or closed).
Piazza stairs, front and back.
Name of each elevation, scale, and architect's name on each drawing.

WOODSHOP DRAWING SEAT

L. W. Kunkle, Philadelphia, Pa.

In schools where equipment, or space, or both are limited, a handy seat that can be attached readily to the workbench is very welcome. The seat shown herewith can be used also in general shops for the correlated shopwork. While not in use, the seat may be stored under the bench.

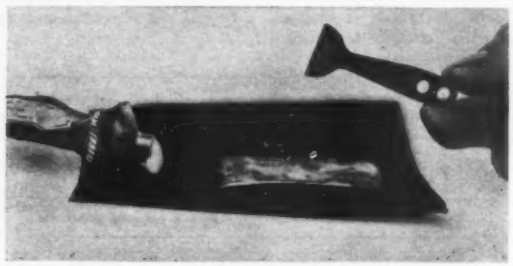


WOODWORK SHOP DRAWING SEAT.

PASTE-SPREADING TOOL

Frank Bentley, Missouri Valley, Iowa

The ordinary white tube paste is a good adhesive, but usually there is nothing handy with which to handle and apply it. An excellent little tool can be quickly and easily made from an old vibrator hammer removed from a Ford coil. Hundreds of these parts are thrown away by the auto mechanics throughout this country every day. To make this paste spreader, simply remove the vibrator hammer from the bridge portion of the coil and cut the circular end in two as shown. Dull the edge a little and polish the thin steel piece. The result is a little tool which is very handy for cutting the paste from the mouth of the tube and spreading it out thinly and evenly.



PASTE SPREADER.

ARROWHEAD ON RULING PENS

George E. Myers, South Junior High School
Everett, Washington

When a set of drawings is to be made, it is difficult to get all the lines of uniform weight. If one has a ruling pen which is graduated and numbered on the thumb nut, this difficulty is considerably lessened. But with the ordinary pen, if all outlines are to be made of the same weight on every drawing, it is necessary to set the pen by testing it on a scrap of paper. Considerable time can be saved if an arrow is scratched across the thumb nut of the ruling pen. The position of this arrow can then be noted for the different thickness of lines after which the pen can be quickly and easily adjusted to duplicate a line of any given weight. The same method can be used on the compasses to make arcs and circles of a weight equal to the straight lines.

THE DAILY GRADE CARD

W. R. Tucker, Mingo Junction, Ohio

This grade card was originated in order to have a complete record of the shop students at all times, and in order to save time in making the monthly grade reports.

DAILY SHOP GRADE CARD

Manual Training Department

Name John Smith Class 8-a

Bench No. 14 Squad No. 3

DATE	GRADE	DATE	GRADE
9-6	86		
8	80		
13	82 Bench dirty		

THE ORIGINAL CARD MEASURES 3 BY 4 IN. THERE ARE 20 LINES FOR MAKING ENTRIES.

There seems to be some objection to daily grades, on the part of some of our so-called higher authorities on manual training, but after using the system for two years, I find that it is very much worth while. It requires less than five minutes to check the cards of a class of twenty boys, and this takes the instructor to each bench. This daily contact keeps him in touch with the entire class.

The cards are kept in a regular card rack (made by the boys) just inside the shop entrance. As a class enters the shop, each boy takes his card from the rack and carries it to his bench. Here it is laid, face up until it is graded. Then the boy returns it to its proper place in the rack as he passes out.

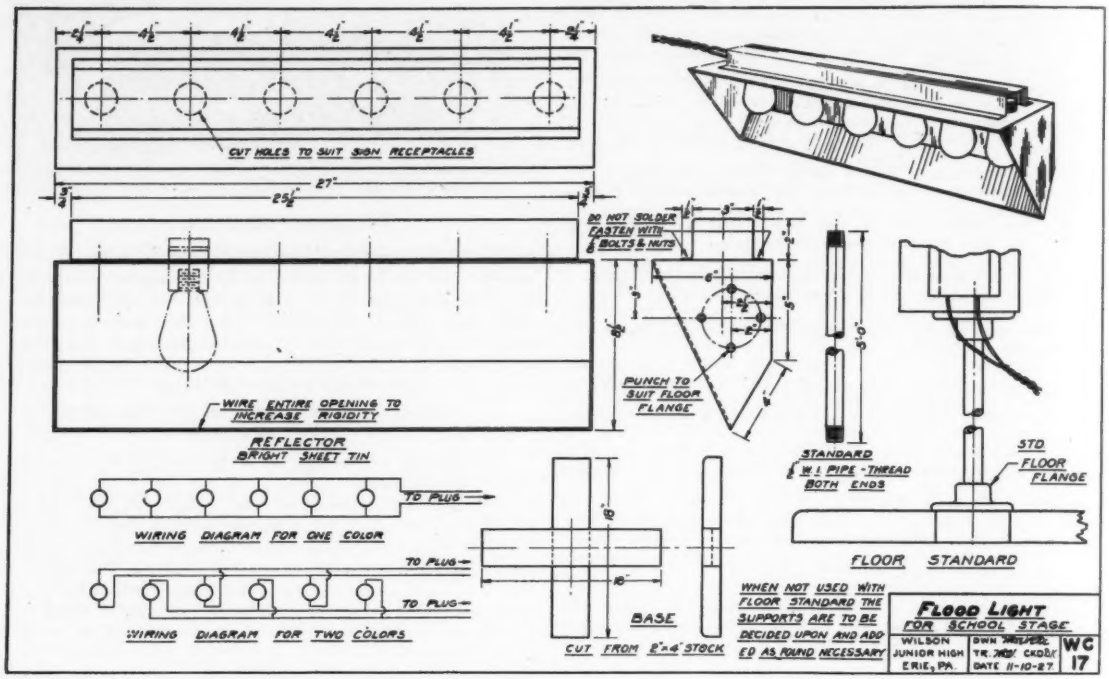
In case the boy has in any way neglected his duties in cleaning his bench or caring for his tools, a note is placed on his card which brings the matter to his attention.

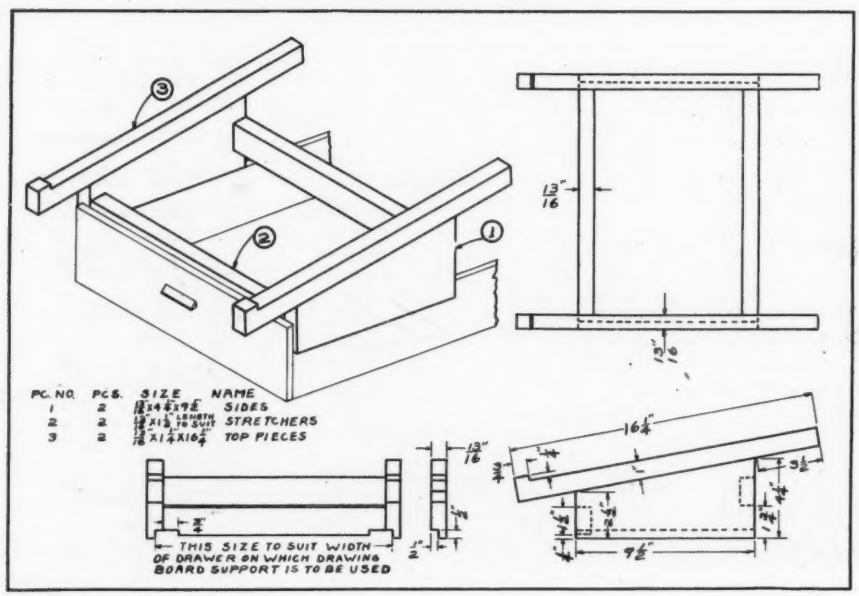
FLOOD LIGHTS FOR THE SCHOOL STAGE

W. A. De Vette, Wilson Junior High School
Erie, Pennsylvania

Flood lights are always needed to produce the proper lighting effects for dramatic productions in schools. As a rule, the teachers in charge of these productions know what effects they desire, but they do not usually know how to obtain them. It is to meet this general need that the flood light illustrated herewith, was designed and built. We found that six of these lights were adequate for all our work.

Reference to the drawing will show that the lights are designed for use both over the stage and on the floor in the wings. They may be used for one color or for two or even more colors if it is desired.


CUT HOLES TO SUIT SIGN RECEPTACLES
27"
25½"
DO NOT SOLDER FASTEN WITH BOLTS & NUTS
WIRE ENTIRE OPENING TO INCREASE RIGIDITY
PUNCH TO SUIT FLOOR FLANGE
REFLECTOR BRIGHT SHEET TIN
TO PLUG
WIRING DIAGRAM FOR ONE COLOR
TO PLUG
TO PLUG
WIRING DIAGRAM FOR TWO COLORS
BASE
CUT FROM 2"x4" STOCK
STANDARD ½" I.P. PIPE - THREAD BOTH ENDS
STD FLOOR FLANGE
FLOOR STANDARD
WHEN NOT USED WITH FLOOR STANDARD THE SUPPORTS ARE TO BE DECIDED UPON AND ADDED AS FOUND NECESSARY
FLOOD LIGHT FOR SCHOOL STAGE
WILSON JUNIOR HIGH ERIE, PA.
DATE 11-10-27
WC 17


PC. NO. PCS. SIZE NAME
1 2 SIDES
2 2 STRETCHERS
3 2 TOP PIECES
THIS SIZE TO SUIT WIDTH OF DRAWER ON WHICH DRAWING BOARD SUPPORT IS TO BE USED
13/16"
16¼"
7½"

DRAWING-BOARD SUPPORT.

The design was made in such a way that the whole project might be built in the general shop and it is a very good project for this purpose as it includes four activities: sheet metal, electric wiring, pipe fitting, and woodwork.

Bill of Material

- 2 pc. 2x4x18 Pine Base Blocks
- 1 pc. 15x39 Bright Tin Reflector
- 1 pc. 8x25½ Bright Tin Guard
- 1 pc. ½x60 Iron Pipe
- 8 ⅛x1-in. f.h. Stove Bolts
- 4 ⅛x¾-in. f.h. Stove Bolts
- 2 ½-in. Standard Floor Flanges
- 1 Electric-Light Cord, length to suit
- 6 Electric-Light Bulbs, color as desired
- 1 pc. 12-gauge Wire, 74 in. long
- 1 1½-in. No. 10 Wood Screw

4 1¼-in No. 10 Wood Screws
6 Sign Receptacles
4 Stove Bolts

DRAWING-BOARD SUPPORT

John J. Metz, Milwaukee, Wis.

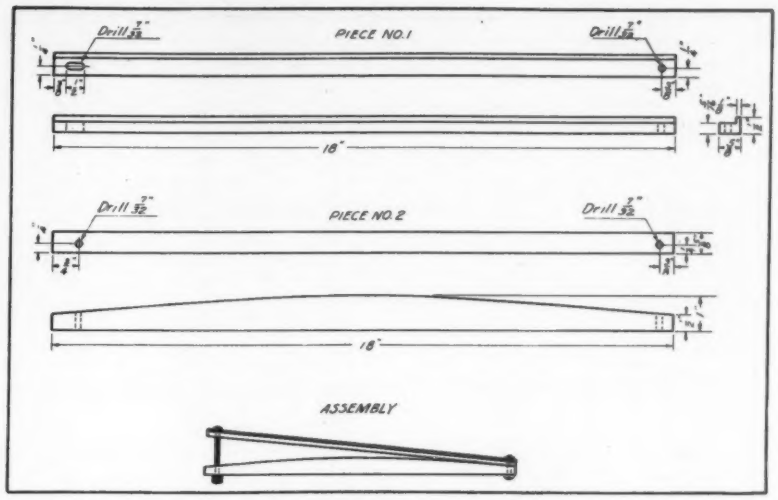
The drawing-board support described on page 294 was designed to fit on top of the upper drawer of a desk. It occupies little room when it is not in use, but it is very convenient for supporting the drawing board when the teacher finds it necessary to do some drawing himself.

The slight tilt at which the board is held will be found to be just right for drawing while the draftsman is seated on the desk chair. This bit of accessory equipment requires little material and it can be easily and quickly made.

AN ADJUSTABLE CURVE

M. H. Shillinger, South High School Grand Rapids, Mich.

It sometimes happens in the drafting room that a line with very slight curvature must be drawn and a suitable irregular curve is not available. The accompanying drawing illustrates an adjustable curve which is easily made and serves the purpose perfectly.



AN ADJUSTABLE CURVE.

A 1 by $\frac{7}{16}$-in. stove bolt is used to fasten the two pieces together at one end, and another, 2½ in. long, is used to adjust piece No. 1 to the curve desired. Maple or some other hard, close-grained wood should be used. The adjusting screw should be loosened when the curve is not in use.

The author has found this piece of equipment much in demand in some of his drawing classes, especially for drawing the curves on columns in the orders of architecture, and other similar work.

RACKS FOR REED AND RAFFIA

Bertha Thompson, Ojai Valley School, Ojai, Calif.

Many teachers visiting the arts and crafts workroom in our school have commented on the convenient arrangement of the basketry supplies. It has been suggested that I publish the working drawings for the reed and raffia racks so that other teachers might use them.

The rack for reed when finished measures 8 ft. That is, 2 racks are made as shown in Figure 1, and set end to end. They may be fastened together with 2 or 3 hooks and screw eyes. The reed can then be placed on the shelves in the long hanks in which it comes from the factory. The loop in each hank is at the left end of the rack, and single strands are pulled out as wanted.

Figure 2 shows that on the broad shelf of the rack there is room for a number of spindles on which to keep a small quantity of reed of different sizes rolled ready for soaking. We use these for weavers, and cut the spokes for baskets from the long straight reed on the shelves, and soak them afterwards.

The lowest spaces in the racks could be made into lockers, if locker space is needed. I have stained the racks to match the woodwork of the room.

The raffia rack in Figures 3 and 4 needs no explanation. We have found it very helpful to have our supply of raffia hanging in braids, tied at the top in such a way that a single strand can be pulled out from the bottom. The riot of colors in the raffia gives the room a cheery appearance.

A CHART OF TYPICAL BUILDING CONSTRUCTIONS

John F. Faber and Fay Daley, Erie, Pa.

(See Supplement No. 102.)

Students of architectural drawing oftentimes ask questions about how certain parts of a building are put together. Especially is this true when they are drawing elevations.

The accompanying chart will answer most of these. Those teachers located in certain parts of the country where a very limited amount of building is done and where there is no opportunity for the student to study buildings under actual construction, will find this chart very helpful.

It is not to be assumed that the constructions shown are the only ones used, but after careful investigation, these were chosen as being generally recognized as good construction.

Fig. 2.

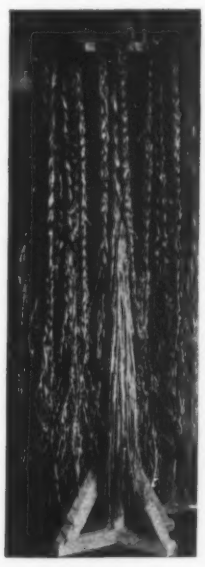


Fig. 4.

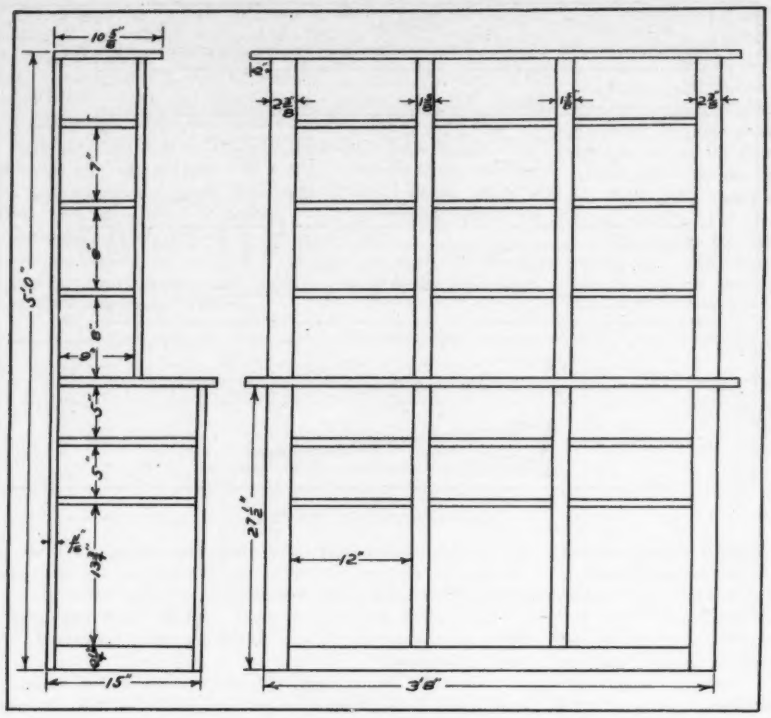


FIG. 1. RACKS FOR REED.

SCREW BOX

Fred Short, Director of Farm Mechanics, Barron, Wis.

The accompanying drawing shows a handy screw box for use in the home workshop, cabinetmaker's shop, or school woodwork shop. Either hardwood or softwood may be used. The covers are beveled as shown in the detail drawing. This adds to the appearance and makes it easy to slide them back and forth. One of the end covers is set below the others on a pivot formed by driving a brad in at each side. This makes it possible to slide the covers in such a way that any one of the compartments may be opened. The sides and ends can be worked up in one piece and the groove for the covers cut in the piece with a combination plane or dado saw. The covers can also be worked up in one piece and the bevel planed on the edges before the pieces are cut off for each cover. Each compartment will hold a gross of screws of the sizes ordinarily used in benchwork and cabinetmaking. A box of this type may also be used for brads. A stain and varnish finish may be applied if desired, or a few coats of shellac may be put on the natural wood. Labels should be placed on the edge of the box, at the top, showing the size of the screws or brads in each compartment.

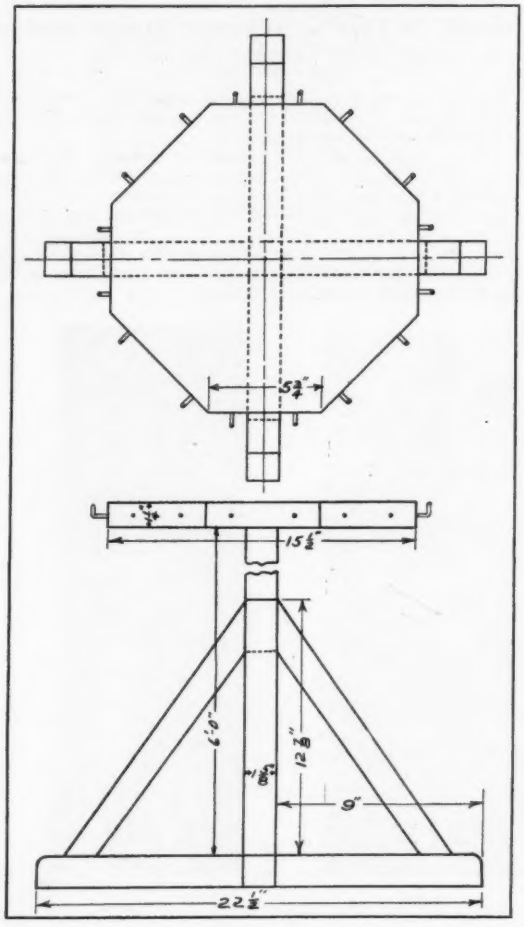
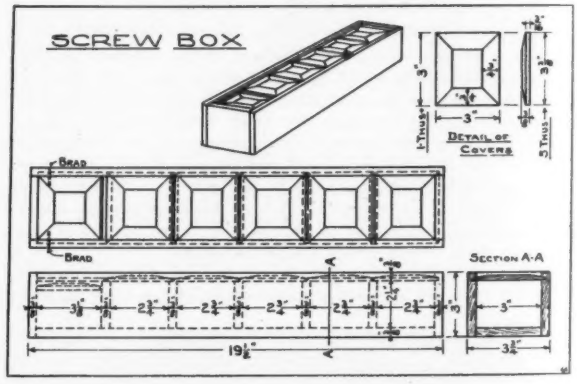


FIG. 3. RACK FOR RAFFIA.



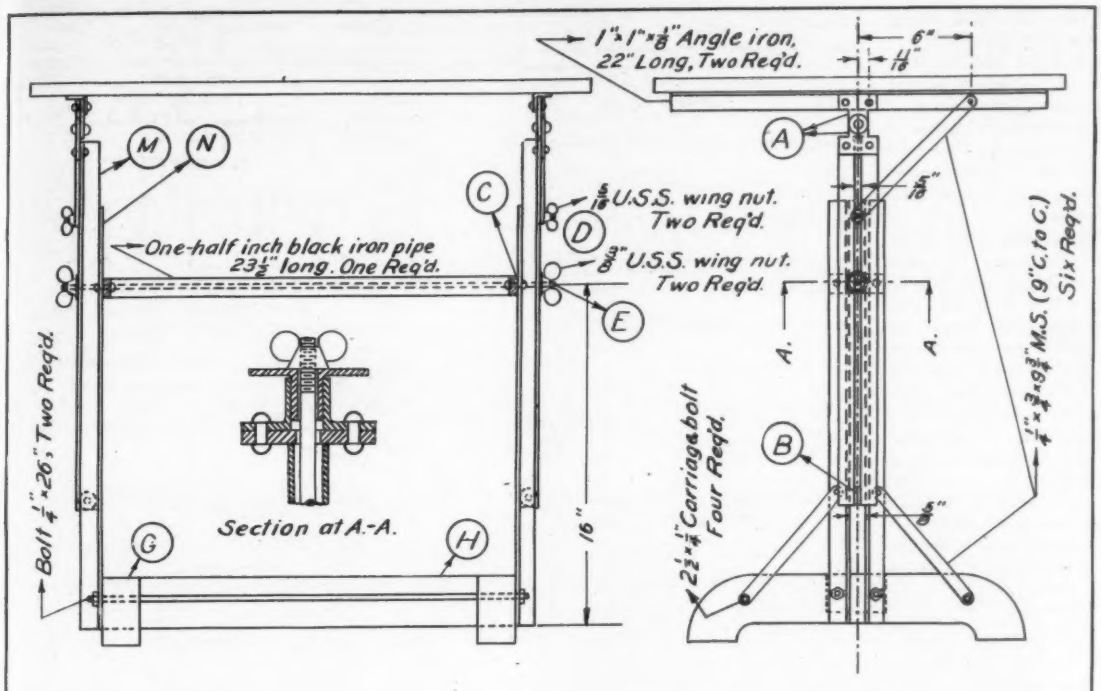
DRAWING TABLE

R. A. Armstrong, Wilson Junior High School Tulsa, Oklahoma

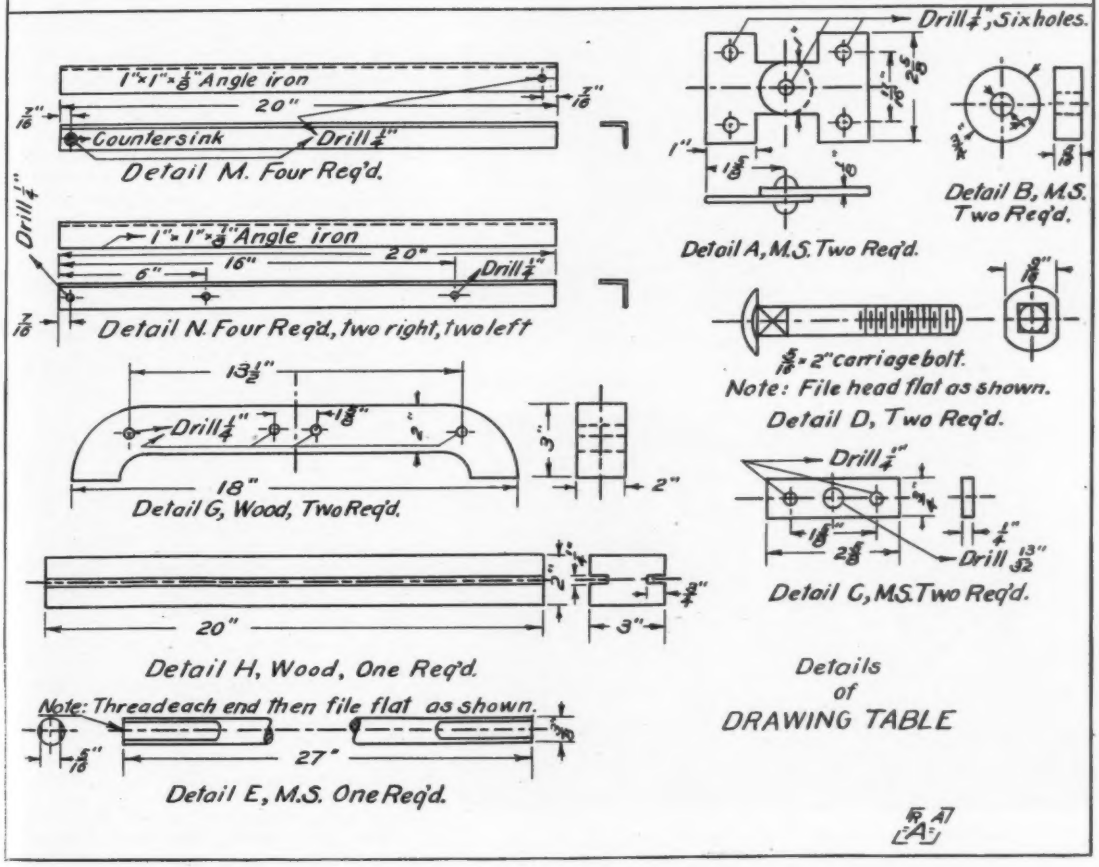
The drawing table shown is offered as a project which is peculiarly adapted to quantity production in the school shop. It is simple enough in construction so that the ordinary school shop can be tooled up to produce it without too great expense or work. Some such job as this in which the boy may be made to see the results of systematic organization and cooperation would seem to be worth while from the standpoint of its educational value.

This particular article possesses the rather unusual merit that it may be in demand by the boy himself to be used in his home or it may be utilized by the school. The metal-work construction involves the use of no more extensive machine equipment than a drill press, and the materials used are all easily obtainable. The table is readily adjustable for height or slope and is light in weight and rigid.

It was designed as a project for the general metal shop in the junior high school but might well be made a joint project for the woodshop and metal shop.



Assembly of DRAWING TABLE



Details of DRAWING TABLE

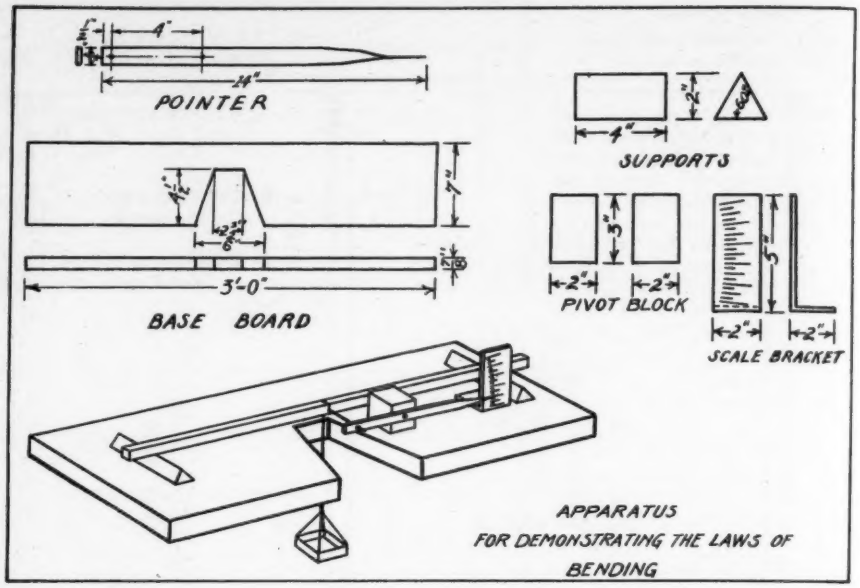
APPARATUS FOR DEMONSTRATING THE LAWS OF BENDING

Leon A. Orr, Principal, Junior High School, Bennington, Vermont

This shop-made device has been in use in our laboratory for several years and has given satisfaction.

The drawing is self-explanatory. The location of certain parts which are screwed to the base is left to the judgment of the maker. The pointer and scale bracket are made of steel, copper, or any other material at hand. The graduations can be marked on paper and pasted to the upright part of the bracket.

Different kinds of rods may be substituted for testing. Each rod must have a stiff wire bent around the center and projecting through a hole in the wide end of the pointer. The scale pan is supported from the center of the rod.

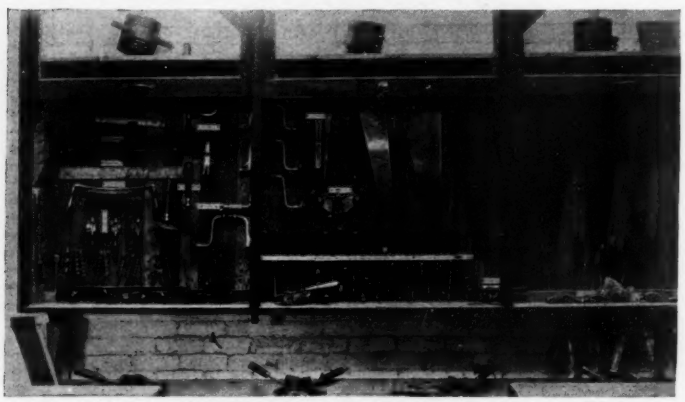


APPARATUS FOR DEMONSTRATING THE LAWS OF BENDING

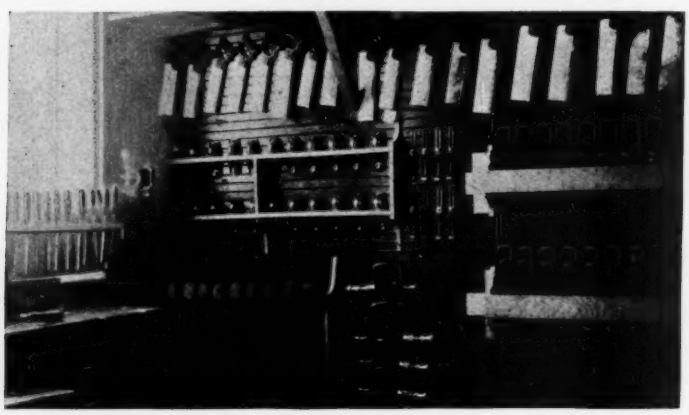
A TOOL CUPBOARD OR TOOLROOM

J. D. Wilson, Los Angeles, California

Two methods of keeping wood shop tools are shown. One, a case built on the wall, has weighted doors that raise up, giving access to all the tools, yet making it possible to see if all the tools are in place, even though the doors are down and locked. This type serves nicely where the quantity of equipment is small.



TOOL CUPBOARD, DESIGNED BY J. D. WILSON, LOS ANGELES, CALIF.



TOOLROOM, J. D. WILSON, LOS ANGELES, CALIF.

The second illustration shows a toolroom about 8 by 10 feet in size. All tools are in racks on the wall, making it possible to see all of them at a glance. Of course, the size of the room will determine somewhat the grouping.

The plans are shown simply to present a good method of caring for tools; making it an easy process to find a tool; and just as easy to check up to see if they are all returned.

PUPIL-PROGRESS CHART

Riley S. Williamson, Assistant Supervisor of Industrial Education, Baltimore, Maryland

Grading pupils' work presents a problem which has given much concern to those interested in the administration, supervision, and teaching of shopwork in elementary, junior high and senior high schools.

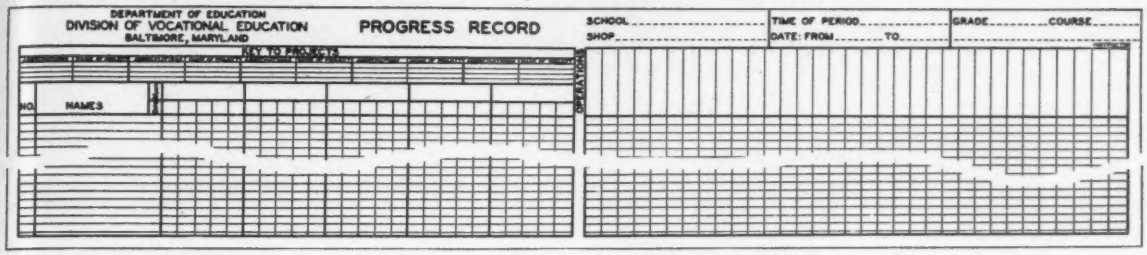
Realizing thoroughly the magnitude and importance of the job of grading, and knowing from experience how difficult it is to give accurate and unbiased grades at the intervals when these are requested by the school administrators, the progress chart herewith illustrated has been devised by the industrial-education department of Baltimore to be used in the elementary, the junior high, and the senior high schools of that city.

The chart is designed to supply more than the data necessary for the teacher's use when he is about to submit the term grades of his class. It is printed on paper measuring 8½ by 22 in. The record of each member of an entire class is thus placed on one sheet of paper of a convenient size, so that it may be shown to an inquiring parent, employer or pupil whenever that is requested. After the class has been promoted, the chart becomes a part of the permanent records of the school, and is usually filed in the principal's office.

The teacher should always bear in mind, that a parent has a right to know *why* his boy received a grade of 50 while the neighbor's boy in the same class received 95. If the teacher does not have means of recording in detail, the progress of each pupil who attends his classes, he will often be in a defenseless position trying to combat the rebuffs of a persistent parent.

Before it is possible to intelligently fill in the proper headings under the caption "Operations" on the progress chart, the teacher must have thoroughly analyzed his course of study. This analysis in itself will give promise of a better year's teaching than would result without such an analysis.

Under the heading "Operations" should be listed all of the fundamental operations which it is estimated that an accelerated pupil of


DEPARTMENT OF EDUCATION
DIVISION OF VOCATIONAL EDUCATION
BALTIMORE, MARYLAND
PROGRESS RECORD
SCHOOL
SHOP
TIME OF PERIOD
DATE: FROM TO
GRADE COURSE
KEY TO PROJECTS
NO. NAMES
OPERATIONS

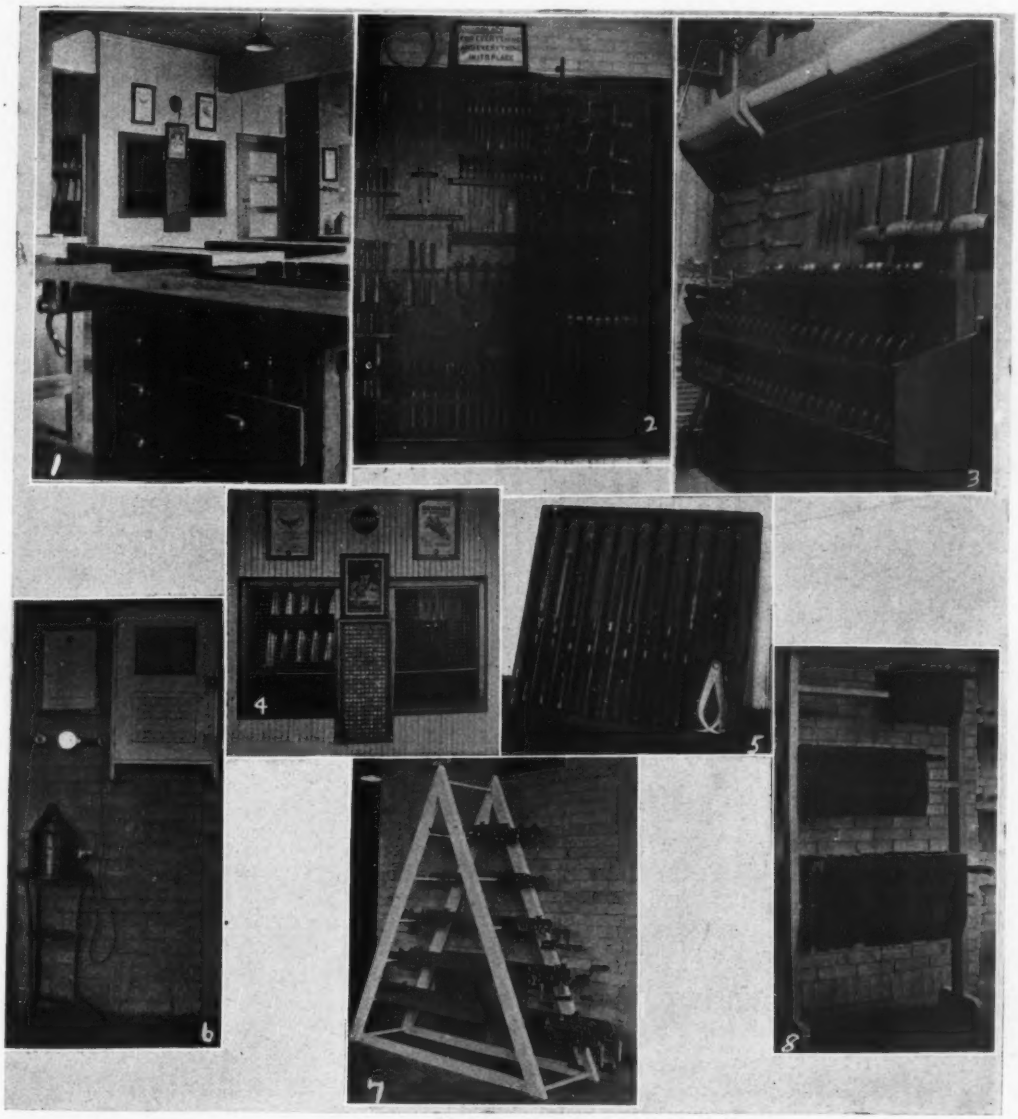
THE ORIGINAL FORM OF THIS PROGRESS CHART MEASURES 9½ x 23. IT HAS ROOM FOR 39 NAMES.

the grade, subject, and semester concerned will be able to become acquainted with.

When a pupil has finished an operation to the best of his ability, he is given a final grade for it in the space provided for the purpose.

It has been found desirable by many teachers in Baltimore to enter these preliminary grades in pencil, for it is frequently found that the pupil's increased skill merits a higher grade before the course is ended.

A comparative individual accomplishment record (in point of operations performed) can be readily obtained by examining this part of the chart, while the first half of the chart shows a record of the projects made or jobs completed.



VIEWS OF THE WOODWORKING-DEPARTMENT TOOLROOM AND UTILITIES, DESIGNED BY M. C. KOONS, HIGH SCHOOL, FARRELL, PA.

A corner of the toolroom is shown at 1. Nos. 2, 3, and 5 show the arrangement of the tools. No. 4 is a close-up of the toolroom windows. The tool check board is located between the two windows. No. 6 shows the electric glue heater equipped with a pilot light. Nos. 7 and 8 show convenient racks for storing clamps.

MR. CASS GOES TO GENERAL MOTORS INSTITUTE

Mr. Earle M. Cass, instructor in vocational education at the University of Pittsburgh, Pittsburgh, Pa., has accepted a position as assistant to the director of the General Motors Institute of Technology at Flint, Mich.

MR. EARLE M. CASS
Assistant Director, General Motors Institute of Technology.

Mr. Cass is a graduate of the Oswego Normal School at Oswego, N. Y. He holds a bachelor of science degree given by teachers' college, Columbia University, also a master of arts degree from the University of Pittsburgh.

Mr. Cass has had considerable experience as a teacher of industrial work in the public schools and is an experienced workman in the trades. During the past two years, Mr. Cass has had charge of the student-teaching work in the vocational department of the University of Pittsburgh.

CHAIRMAN OF THE WESTERN ARTS VOCATIONAL SECTION

Mr. Ray F. Kuns, who was recently elected chairman of the vocational section of the Western Arts Association for 1928, is principal of the automotive trade school of Cincinnati.

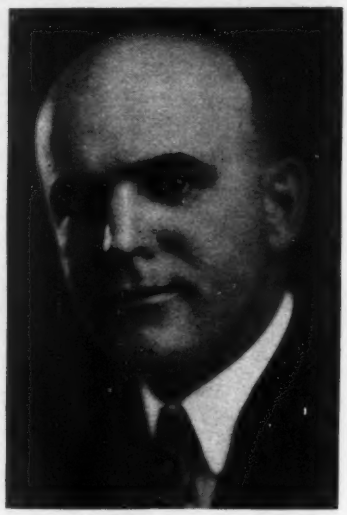
MR. RAY F. KUNS
Chairman, Vocational Section, Western Arts Association.

Mr. Kuns is a native of Ohio and received his early training in the schools of that state. He is a graduate of the manual-arts course of Miami University and has completed a special course in shopwork at the University of Michigan. Previous to coming to Cincinnati, Mr. Kuns was supervisor of industrial arts at Newcastle, Ind., and supervisor of arts at Lincoln Memorial University. In 1912 he became instructor in woodworking and metal working at the Oyler School, Cincinnati, and in 1918 was appointed head of the automotive trade school.

Mr. Kuns is a member of the S.A.E. He has edited the Automotive Digest since May, 1926, and is a frequent contributor to professional magazines. He is also the author of a number of textbooks on automotive subjects.

MR. BADGER GOES TO TULSA, OKLA.

Mr. O. B. Badger, formerly associate professor of industrial education at the University of Missouri, has been appointed as director of part-time and vocational work at Tulsa, Okla.



MR. O. B. BADGER
Director of Vocational and Part-Time Work, Tulsa, Okla.

Mr. Badger received his early training in the schools at Sullivan, Ind., and his professional training at Bradley Polytechnic Institute, the University of Wisconsin, and the Kansas State Teachers College. He holds a bachelor of science degree given by the Kansas State Teachers College and has participated in the special conferences of the Federal Board for Vocational Education.

Prior to going to the University of Missouri as director of industrial education, Mr. Badger was, for one year, associate professor of industrial education at Purdue University. He was state supervisor of trade and industrial education in Oklahoma for two years, and director of industrial education at Wichita, Kans., for four years. Mr. Badger held the office of president of the industrial-education division of the state teachers' associations in North Dakota and Kansas, and more recently was elected president of the same association in Oklahoma.

NEW BOOKS

Building and Flying Model Aircraft

Paul E. Garber. Cloth, 308 pages. Price, $2.25. The Ronald Press, New York City, N. Y.

The author of this book approaches his subject with an unusual background of experience and understanding of the building of model aircraft. As consultant for the National Playground and Recreational Association of America he has, for several years, directed tournaments for testing miniature aircraft in all parts of the United States. These various tournaments have brought him in contact with methods of constructions, the greatest variations in types of models, scale models, etc.

The present book is written frankly for boys and girls. The successive chapters describe in detail the making of kites and model aircraft from the very simplest paper gliders to the most complicated scale models, equipped with compressed-air engines. The text is complete and the directions are clear so that any average boy can follow them. For educational use, the book is made valuable by discussions of the principles of physics involved in aircraft by descriptions of such special material as balsa wood, etc., and by illustrations of famous airplane builders, famous airplanes, and famous fliers.

Mechanical Drawing for Eighth and Ninth Years of the Junior High School

Prepared by a committee of teachers headed by H. B. Cobaugh. Published by the Board of School Directors, Harrisburg, Pa. 103 pages, paper cover.

This book offers a complete course for the junior high school. The text matter is limited to the most necessary information concern-

ing the use of instruments, the steps in making a drawing, tracing, inking, blue printing, geometrical forms, etc. The greater proportion of the book is devoted to a series of well-graded problems beginning with the simplest block forms and leading to rather complicated machine parts and furniture. The book depends entirely for instructional method upon the teacher's direct instruction.

Studies in Occupations

By the Department of Labour, Ottawa, Canada. Paper, 5½ by 8¼. Issued by the Technical Education Branch, Department of Labour, Ottawa, Canada.

Bulletin No. 1 is a study of bricklaying, and Bulletin No. 2, of carpentry.

These studies were made for the purpose of informing young Canadians about the nature and requirements of certain occupations with a view of assisting them in selecting their vocations. The booklets are illustrated and the series, no doubt, will be added to as time goes on.

A Course in Personal Development for the Business Girl

By the Division of Vocational Teacher Training and Research under the direction of Miss Hattie E. Anderson. Mimeographed, 23 pages. Published by the Milwaukee Vocational School, Milwaukee, Wis.

This course in personal development for the business girl is based on a 2-year program. There are 80 units of 2½ hours each. The work is arranged as follows:

The Business Girl and Her Clothing, Her personal Appearance, Her Recreation and Development, Her money, Her Food, Her Health, and In the Home.

The Plan of Organization and the Objectives of the Home-Making Division

By the Division of Vocational Teacher Training and Research, under the direction of Miss Hattie E. Anderson. Paper, mimeographed, 51 pages. Published by the Milwaukee Vocational School, Milwaukee, Wis.

The plan of organization shows the following:

Subject	*No. of Units*
Foods, Elementary	40
Foods, Intermediate	40
Foods, Advanced	40
Clothing, Elementary	42
Clothing, Intermediate	40
Clothing, Advanced	95
Millinery	24
Home Management	20
Home Laundry	20
Home Mechanics	14
Personal Hygiene	10
Home Nursing, Infant and Child Care	20
Home Nursing, Prevention of Communicable Diseases	10
Home Nursing, Adult Nursing	20
Home Nursing, Prevention of Accidents and First Aid	10
Hair Dressing and Facial Hygiene	20
Art	10
Art in Relation to the Girl	15
Art in Relation to the Home	15
In and About the World of Science	20
Everyday Science in the Home	20
Music Appreciation (First Year)	20
Music Appreciation (Second Year)	40
Appreciation of Books	20
Personal Problems and Responsibilities (First Year)	40
Personal Problems and Responsibilities (Second Year)	40
Personal Problems and Responsibilities (Third Year)	40

Strength of Materials

By Thaddeus Merriman. Cloth, 204 pages, 5 by 7½, illustrated. Price, $1.75. Published by John Wiley & Sons, New York City.

This is the seventh edition of a well-known textbook that has a good reputation since the appearance of its first edition. The present book has been revised and reset.

Nash-Van Duzee Industrial-Arts Tests
Test 1, Woodwork; Scale B, Performance

By Harry B. Nash, and Roy R. Van Duzee. Specimen package containing one test, one manual of directions, and one class record, 65 cents. Manual of Directions, 50 cents. Complete set consisting of 25 tests, and one class record, $1.10. Published by The Bruce Publishing Company, Milwaukee, Wis.

This woodwork test is a companion to the scale A test by the same authors. The purpose of the scale B test is to ascertain how much skill the student has developed in woodwork. The manual of directions fully explains how the test was constructed and validated, how it is to be administered, and how each problem is to be scored.

There also are tables showing median score norms based on non-time and time situations for junior and senior high schools, and a table for changing the percentile norms into the ordinary school ratings.

The Scale B test is not to be confused with the Scale A test. The former tests skills, while the latter tests the students' knowledge of technical and related information.

Modern Business

By Leon C. Marshall and Mildred J. Wiese. Cloth, 520 pages, 5¼ by 7¾, illustrated. Published by The Macmillan Company, New York City.

The purpose of this book is to furnish a background of general information about business activities to the student of high school and college level in sociology, economics, and commerce.

The book is divided up into sections on problems of administration, personnel work, marketing, finance, and business organization.

The numerous organization charts, interspersed throughout the book, assist the reader in obtaining a clear diagrammatic picture of the different phases of the modern business world. While the book contains many good illustrations, there are some that are not as clear as illustrative material ought to be. They detract somewhat from the excellency which marks the book in general.

Puzzles in Wood

By E. M. Wyatt. Paper, 64 pages, 5⅞ by 8⅛, illustrated. Price, 60 cents. Published by The Bruce Publishing Company, Milwaukee, Wis.

In this little pamphlet, the author is offering an interesting set of puzzles as supplementary projects for the woodwork shop. These puzzles have much to commend them. They can be made of odds and ends found in the scrap box; they require accurate work, and the final result cannot help but thoroughly interest the boy.

Some of the puzzles shown are so simple that the least skillful boy will be successful in making them, while some will tax the skill of the most accomplished worker. Some of the older woodworking teachers will be delighted with the book, because it describes several of the old-time trick joints that used to be popular in the early manual-training days.

PERSONAL NEWS NOTES

Mr. O. J. Dorr, director of the vocational school at Fond du Lac, Wis., has gone to Fort Collins, Colo., where he will take an intensive summer-school course at the Colorado Agricultural College. Mr. Dorr will give his entire time to a course in survey methods, which will be taught by Dr. Charles R. Allen.

Mr. Herman Huth has been appointed as a member of the board of industrial education at Beaver Dam, Wis., to succeed Mr. Ira E. Burtis.

Mr. Harold Reppe of Zumbrota, Minn., has been appointed instructor in printing in the vocational school at Neenah, Wis. Miss Margaret Williams of Madison, was appointed instructor in home economics.

Mr. Claude M. Henry has been appointed as a member of the Federal Board for Vocational Education.

Mr. Herb. Heilig, director of the vocational school at Appleton, Wis., will attend summer school at the State Agricultural College at Fort Collins, Colo.

Mr. F. J. Finkbeiner, for the past six years shop instructor at the Stevens Point, Wis., Vocational School, has accepted a position with the Wisconsin Industrial Commission.

Mr. Joheph Horney of Buffalo, N. Y., has been appointed manual-training assistant at Salamanca.

Mr. C. F. Bullock of Treverton, Pa., has been elected director of vocational education in the Pottsville high school.

Mr. A. R. Graham of Madison, Wis., has been elected president of the Wisconsin vocational-school directors. Other officers chosen were Mr. H. P. Hurley, West Allis, vice-president; Mr. John Tepoorten, Cudahy, secretary-treasurer; and O. J. Dorr, Fond du Lac, executive board member.

Mr. Orin Hofferbert has been elected as president of the vocational board at Beaver Dam, Wis. Other members of the board are Mr. Julius Seering, Mr. Herman Huth, Mr. Edward Hamann, and Mr. W. R. Davies.

Mr. S. E. Crockett, director of the Menasha, Wis., Vocational School, has been elected president of the Fox River Valley Directors' Association. He succeeds Leonard Evans of Sheboygan.

Mr. W. H. Carter of Longton, Kans., has been elected as head of the vocational-guidance deparment at the Roosevelt Junior High School, Coffeyville, to succeed Paul Brooks.

Mr. A. D. Evans has been elected as manual-training instructor at Rolfe, Iowa.

Mr. Ralph W. Babb of Lynn, Mass., has been elected as president of the Vocational Society of Boston. Other officers elected were Mr. James T. Gearon, Everett, vice-president; Mr. A. C. Hanson, Lynn, secretary; and Mr. W. C. Brown, Boston, treasurer.

Mr. Nicholas Ricciardi, chief of the division of city secondary schools of the state of California, and state director of vocational education, recently received an honorary doctor's degree from Stout Institute, Menomonie, Wis.

Mr. F. C. Lampe, director of the educational department of Barnhart Brothers & Spindler, assisted Prof. R. M. Coffelt in the direction of nine weeks' printing course at the Kansas State Teachers' Club at Pittsburg. Mr. Lampe handled the first part of the course with a series of lectures, illustrated by many interesting displays. The lectures were based on subjects which are of vital interest to the students seeking practical knowledge in the printing arts. The second part of the course was conducted by Prof. Coffelt, who handled the subject from the teacher's point of view.

NOW, ARE THERE ANY QUESTIONS?

Manual-Arts Programs

805, 806, 807. Q.: I would appreciate it very much if you could advise me where I can get plays and ideas for programs for manual-arts classes to present.—*C.E.B.—M.S.—C.C.S.*

A.: In the June, 1918, issue of the INDUSTRIAL-ARTS MAGAZINE, a graduation program was published which, no doubt, would be interesting to you. Since it is questionable whether you have access to the 1918 file of our magazine and since there are no copies of this issue at hand, we are giving you a résumé of the program.

The author, Wm. A. Carter of New York City, describes an entertainment which was designed to interest the parents and the public at large in industrial arts. There were, of course, musical numbers on the program. The industrial-arts part of the program, however, consisted of an actual class demonstration on the stage. A large drawing of a simple project (in this case a footstool) was made and hung up so that it was plainly visible from any part of the auditorium. Two double benches with full shop equipment were placed on the stage and turned so that the arrangements of the tools inside of the benches and the work to be done by the boys was fully visible from the auditorium chairs. The stock to be used was placed on one of the benches.

A dependable boy was chosen to act as foreman and the entire work was fully discussed with him prior to the public exhibition, so that he knew just what was needed and just how each piece was to be made. On the day of the exercises, the boys who were to participate in the work were called together and it was explained to them that some of them would be called to participate in the actual making of the project. They were cautioned to be on the alert to see what was going on, so that they could jump in at any time to go on with the work. They were also cautioned to look carefully both at the work and the drawings before they proceeded with their particular job and that if they were uncertain about how to go ahead, they were to consult the foreman. The foreman was on the stage all of the time. It was his duty to keep the others going and to watch their mistakes.

Before beginning the actual making of the projects, the program was briefly explained to the audience and then the superintendent (or some other official of the school) called upon four of the boys whose names were printed on the back of the program, to start the work. Every three or four minutes thereafter four other boys were relayed to the stage to continue the work. The idea was to have as many boys as possible to work on the project and at the same time show that these boys had not been trained to do only one particular part of the work.

The program worked out very well. The first four boys were, of course, nervous and floundered around. The next four were a little better and after that the audience became quiet and displayed interest. It took just 27 minutes to finish the simple footstool which they were making.

If you are interested in plays suitable for industrial-arts programs, you will find one on page 85 of the March, 1928, issue of the INDUSTRIAL-ARTS MAGAZINE. You can obtain similar plays by addressing Mr. M. C. Richmond, 18 Reckless Place, Red Bank, N. J., who has written and published several of them. The following can be obtained from him: "The Dreamer," "Reaching for the Moon," "Blind Alley," and "White Collars."

"Programs for the Auditorium" by Paul V. Wilcox appeared in our June, 1928, issue.

Finishing of Walnut

809. Q.: I am going to finish (*a*) several projects made of walnut lumber. Would clear shellac finish over linseed oil prove satisfactory?

We are making (*b*) a writing table of gumwood (red) to be finished in walnut. All drawer fronts are of curly maple veneer. What finish would you suggest on the drawer fronts?—*W. W. R.*

A.: In finishing walnut, it is preferable that the work be sponged in clear water, dried, resanded with a split 4/0 garnet paper, water stained, coated with orange shellac reduced with two parts of denatured alcohol, dried, sanded with the paper used in the first instance, filled, and given three or four coats of 2-lb. shellac, sanded between coats with a split 6/0 paper, the last coat being rubbed with crude oil and pumice stone. I hesitate to recommend the linseed oil since there are so many conditions under which it may cause trouble in this class of work.

The gum case should be given a water stain, shellac, and as many coats of varnish or shellac as desired. The final coat should be rubbed out in crude oil and pumice stone, and not left in too high a gloss, that produced by FFF pumice stone being about right. Clean up with a good polish. The maple drawer fronts should be given an antique maple finish which may be produced with a water stain or an oil stain. For the first, use 2 oz. of potassium dichromate per gallon of water and toned with sap brown or walnut crystals to get the shade as brown as desired.

A real good high-lighting effect can be produced by staining the maple a trifle dark, drying, and then sanding quite light in those central portions where the light strikes the eye most strongly and fading out the sanding to leave the darker shadows along the outer edges of the drawers. A thin coat of orange shellac, diluted with two parts of denatured alcohol should be used to tone the work to a rich and distinctly golden tint. The shellac is best applied with a wide soft bristle or fitch brush in continuous strokes entirely lacking in cross brushing.

When dry, sand with a split 6/0 paper and give two or three coats of varnish sanding between coats and rubbing the last with the crude oil and FFF pumice stone. Clean with a good polish. In case the water-stain materials are not available, use 4 tbsp. of brown asphaltum varnish per quart of gasoline, then three parts of this mixture to one part turpentine. Let dry over night and then proceed with the shellac coat. If shellac is used throughout, the first coat should be orange, the others white so as to avoid too much of a golden cast, such as would occur with several coats of orange shellac. —*Ralph G. Waring.*

Kitchen Cabinets

810. Q.: We are proposing building one or two kitchen cabinets in our shop and want to make them a little different from the common stock cabinets. Can you tell us where we can purchase the fixtures for these cabinets, such as flour bins and sifters, bottle holders, porcelain tops, etc.?—*E. M.*

A.: Kitchen-cabinet equipment may be obtained from the following firms:

Flour Bins: Shawney Metal Mfg. Co., Shawnee, Okla.; John E. Mannen Co., 2242 St. Clair Ave., Cleveland, Ohio; E. C. Dehart Co., Coshocton, Ohio.

Flour Sifters: Meyers Mfg. Co., Hamilton, Ohio; Clark Mfg. Co., 570 23rd Ave., Rockford, Ill.; J. H. Day Co., 1144 Harrison Ave., Cincinnati, Ohio; Triumph Mfg. Co., 3400 Springgrove Ave., Cincinnati, Ohio.

Glassware: Sneath Glass Mfg. Co., Hartford City, Ind.

Jars: D. C. Jenkins Co., Kokomo, Ind.; Brush-McCoy Pottery Co., Zanesville, Ohio; Monongah Glass Co., Fairmont, W. Va.

Table Tops: Vitreous Steel Products Works, Nappanee, Ind.; Baltimore Enamel Novelty Co., P.O. Box 34, Baltimore, Md.; Porcelain Enamel & Mfg. Co., Baltimore, Md.; American Enameled Products Co., 2101 Indiana Ave., Chicago, Ill.; Vitrolite Co., Chamber of Commerce Bldg., Chicago, Ill., Kewaunee Mfg. Co., Kewaunee, Wis.

Auto Paint Remover

814. Q.: Would you please give me a formula for a paint remover to be used on automobiles. I have been told there is one which may be applied, and then by spraying water upon the body all paint will be removed.—*J. C. B.*

A.: There are a number of patent preparations on the market for this purpose, but in factory practice I find the following is practical if used with common sense and some judgment.

Caustic soda, commercial	75 lb.
Trisodium phosphate	15 lb.
Sodium carbonate	10 lb.

Of this mixture, use ½ lb. per gallon of water. In its application, which must be on metal parts only, the hands should be well treated with vaseline or gear grease and in addition be covered with rubber gloves. It is also desirable to wear goggles and if the workman is inclined to be in a hurry and to spatter his work, he should be required to vaseline all exposed parts of his face and neck. The solution should be applied with fiber scrubbing brushes in such a manner as to sop it on, allowing it to remain until the paint material has become partly or wholly digested. At this stage, removal can be facilitated by using a short bristle, steel, scratch brush and flexible wide-blade glazing knife. When the entire body has been covered in this manner, a slow stream of water is used to flush off all surfaces, starting with the top and working down, using a fiber scrub brush and steel wool to speed up the removal of stubborn spots. This is preferably done with hot water as the drying is speeded up considerably. In order to neutralize any caustic remaining in cracks and molding lines, the entire body should be brushed with strong vinegar, allowed to remain half an hour and again flushed off with hot water, after which the body should be dried with cloths and immediately sandpapered or steel-wooled to bright metal, ready for the metal priming coat, which should be applied before any traces of rust appear, but only on a thoroughly dried body having no traces of moisture in cracks or moldings.— *Ralph G. Waring.*

THE FINE ART OF SELECTING THE RIGHT HAMMER

Are your hammers Quality hammers? Are they of the correct weight?

The heads of Stanley Hammers are made of carefully selected steel. They are drop-forged and correctly tempered. The eye of the hammer is tapered from the center in both directions according to a special Stanley design. When the Stanley Patented Wedge is driven home it is almost impossible for the head to come off, and the tapered eye stops the head from working down on the handle. The claws are carefully sharpened so that they will pull the smallest brad.

The weight of every Stanley hammer is stamped on its cheek. The Stanley No. 12, shown here, is recommended for school work. It comes in 5, 7, 10, 13, 16 and 20-ounce weights (weight of head only).

The 10-ounce hammer is generally used in the elementary grades; the 13-ounce in high school shops, and the 16-ounce in trade schools. The 16-ounce is the regular artisan's size.

The catalog number does not show the weight of the hammer. When ordering, specify the catalog number and the weight you want.

THE STANLEY RULE & LEVEL PLANT
Educational Department, New Britain, Conn.

The Patented Stanley Wedge makes it almost impossible for the head to come off.

STANLEY TOOLS

STANLEY TOOLS

Points on Drill Grinding

Putting a proper point on the business end of a twist drill doesn't sound hard—but the fact is that 11 pages, or practically 25% of the "Handbook for Drillers," are devoted exclusively to this all-important thing. In reality pointing a twist drill is a delicate piece of work calling for great skill, and much advance knowledge.

If you would like copies of the Handbook for the use of students in machine shop practice, we shall be glad to send them to you, without charge, in any reasonable quantities.

The CLEVELAND TWIST DRILL COMPANY CLEVELAND
NEW YORK-CHICAGO-LONDON SAN FRANCISCO
TRADE MARK REG. U. S. PAT. OFF. AND FOREIGN COUNTRIES

PUBLICATIONS RECEIVED

Yearbook of the American Engineering Standards Committee for 1928. Paper, 87 pages. Published by the American Engineering Standards Committee, 29 West 39th St., New York City. This booklet gives an idea of the progress of industrial standardization and its influence in industry and commerce. The standardization movement is a strong factor in promoting a wholesome spirit of cooperation in industry as demonstrated by the work of the American Engineering Standards Committee.

After School—What? Vocational Training in the High School, Lancaster, Pa. Paper, 28 pages. H. F. Gress, superintendent of schools. Published by the school board of Lancaster, Pa. This pamphlet offers advice on the selection of a course or trade and is intended to be of assistance in making pupils familiar with the opportunities available. It outlines the industrial and vocational courses which are available through an enriched program dealing with the varied interests, abilities, and needs of the different children.

Bibliography on Foreman Training. Prepared by Mr. Frank Cushman. Bulletin No. 128, April, 1928, of the Federal Board for Vocational Education, Washington, D. C. This pamphlet of 29 pages represents a selected and annotated list of references on recent books, pamphlets, and magazine articles relating to the subject of foreman training. The pamphlet is intended to furnish a practical working reference list of material for use in connection with educational work with foremen and other executives in industry.

A Course in Farm Shopwork for Teachers of Vocational Agriculture. Prepared by A. Carnes. Bulletin No. 5, April, 1928, of the Federal Board for Vocational Education, Washington, D. C. The pamphlet is intended for teachers of shopwork in vocational agricultural schools and departments. The object of the course is to give training in blacksmithing, soldering, woodworking, tool sharpening, and care of tools.

The Tenure of Agricultural Teachers in Mississippi. Prepared by Mr. V. G. Martinn. Bulletin No. 4, April, 1928, of the Federal Board for Vocational Education, Washington, D. C. The pamphlet offers a summary of a study of the factors affecting tenure of vocational teachers of agriculture. It also contains many valuable suggestions to supervisors and others who have the responsibility for promoting programs of vocational agricultural education.

Eighth Report of the Technical Education Branch of the Department of Labor, Canada, for the year ending March 31, 1927. The report shows that the vocational movement in Canada has grown and developed in an encouraging manner. Commercial, home-economics, technical, and general industrial courses have been fairly well established in the secondary schools of 78 municipalities, and over 100 different courses have been organized in connection with evening schools operated in 170 municipalities throughout the Dominion. The total enrollment in day vocational classes has increased from 8,512 to 34,703, and the total enrollment in vocational classes receiving grants under the technical-education act was 96,682 for the past year, an increase of 7,721 over the previous year. The total amount available to provinces under the technical-education law is $2,099,574, and the amount paid to provinces is $1,047,535.

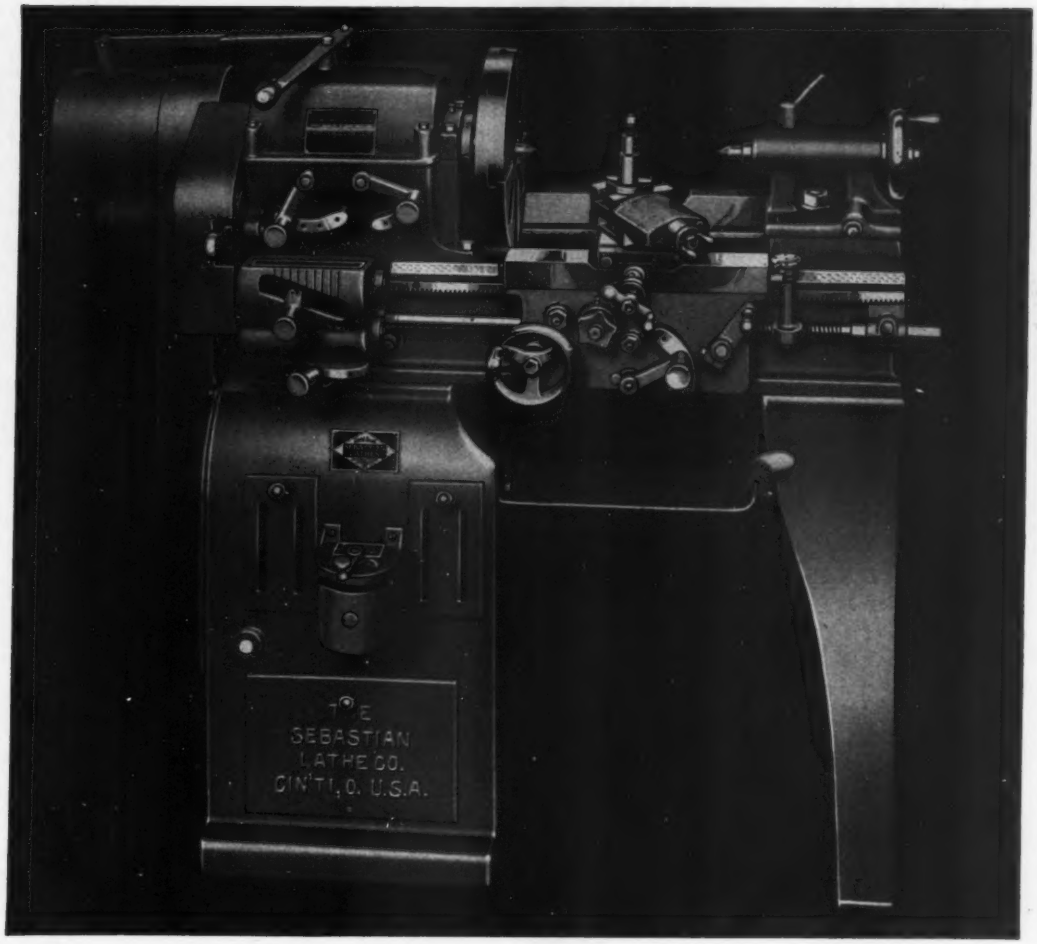
New Format of Educational Screen Magazine. With the passing of the experimentation period of the visual-education movement, The Educational Screen begins its seventh year of existence with its pages devoted to the serious use of visual aids in education. The last six years in this field have witnessed notable progress, and it was deemed imperative that the magazine should keep pace with the progress in the visual-education field. Such a change has involved a number of details, not only in working out a new format, but in the reorganization of the entire work on a larger scale to permit of a healthy expansion in the future.

In connection with the change, there has been added a new department called the "school department," which will be in charge of Dr. F. Dean McClusky of the Scarborough school. The visual study for the month of March is entitled, "A Visual Study of the Panama Canal," by Stella E. Myers.

Tulsa Manual-Arts Club Directory, Tulsa, Okla. Contains the membership roster, the program of meetings, the by-laws of the club, and a directory of manual-arts teachers for 1927-28. Copies may be had by sending a two-cent stamp to Mr. C. S. Washburn, Central High School, Tulsa, Okla.

Plant and Equipment for Vocational Classes in Home Economics. Prepared by Edith M. Thomas. Bulletin No. 10 of the Home Economics Series, and Bulletin No. 124, December, 1927, of the Federal Board for Vocational Education, Washington, D. C. This pamphlet has been issued for the purpose of serving school administrators, teachers, architects, and craftsmen in making, selecting, and arranging the plant and equipment for home-economics teaching. The pamphlet does not include problems of equipment for teacher-training institutions, but it aims to offer information that will aid the teacher of home economics in training girls and women for the efficient discharge of the duties of homemaking. It discusses present tendencies in home-economics plant and equipment, location and layouts of the home-economics department, space arrangements, working conditions, and equipment for individual laboratories.

"a lathe without an alibi"



The Perfect Lathe For Schools

The needs of the manual training shop have been closely studied and as a result we have developed this 11" Gold Seal Heavy Duty Lathe.

Its distinguishable points are:—1. It is a small lathe with large lathe capacity.—2. It is oversized at every point.—3. It is absolutely safe.—4. It is practically unbreakable.—5. It is "sized" down to the student.—6. It is compact and not more "lathe" than you need.—7. It is the type lathe your Student will operate when he finishes School and gets into Industry.

The Sebastian Lathe Company

Cincinnati, Ohio.

Send the attached coupon for detailed information and specifications.

Coupon

The Sebastian Lathe Co., Cincinnati, Ohio.

Send descriptive Bulletin of your New 11-inch Lathe.

Name.....

Position.....

St. & No.....

City..... State.....

IAM-8

Good Schools deserve "Yankee" Tools

Up or Down is the same to this world-famous "Yankee" Spiral Screw-driver.

One-handed you can quickly drive (or draw) screws in tight places.

Drive Screws the Quick, Easy Way

Use "YANKEE" No. 130-A

Wherever there is a hard screw-driving job—that's where you want "Yankee" Quick-Return Spiral Ratchet Screw-driver No. 130-A. For, in any position, driving screws is surprisingly easy and speedy.

The live spring in handle keeps blade in screw slot, and brings handle back ready for the next push—without a second's loss. Just push! The Spring and "Yankee" Spiral do the work for you and save your time. The long reach prevents barked knuckles.

Right-hand Ratchet, Left-hand Ratchet and rigid. Three sizes of bits. No. 130A, standard size, price $3.45; No. 131-A, heavy pattern, $4.60; No. 135, light pattern, $2.65. Without the Quick-Return feature, No. 30-A, price $3.00; No. 31-A, $4.00; No. 35, $2.25.

Some Other "YANKEE" Tools

Ratchet Bit Braces — Ratchet Breast and Hand Drills
Automatic Feed Bench Drills — Automatic Push Drills
Plain Screw-drivers — Ratchet Tap Wrenches
Vises—removable base

FREE

"YANKEE" Tool book for all lovers of fine tools. Write for it.

"YANKEE" on the tool you buy means utmost in quality, efficiency and durability.

North Bros. Mfg. Co., Philadelphia, U. S. A.

"YANKEE" TOOLS

Make Better Mechanics

NEWS AND NOTES

Check Placed on Employment of Graduates of Ahrens Trade School. An arrangement has been perfected by the Ben Franklin Club of Louisville, Ky., whereby members of printing houses may be able to obtain the best talent from members of the graduating classes of the printing and binding departments of the Ahrens Trade School.

Formerly, it has been the custom of the principal to give the Club a list of the graduates and to leave it either for the printers to get in touch with them when an employee is sought, or for the applicant to go directly to the printer on his own initiative.

Under the new arrangement, when an employee is sought from among the graduates, the secretary of the Club will communicate with the trade school, and the principal will select the most desirable graduate. The change is expected to do much to improve the value of the school to Louisville printers and binders.

Vocational School to Conduct Class for Plumbers. A three-day conference for master and journeymen plumbers was held July 18 to 20 at College Station, Tex. The staff of lecturers for the conference included Dr. J. C. Anderson, state health officer; Mr. V. M. Ehlers, state sanitary engineer; Dean C. H. Winkler, of the school of vocational teaching; Mr. E. W. Steel, head of the department of municipal and sanitary engineering; S. E. Dibble, professor of plumbing and technology; Dr. F. E. Giesecke, director of the Texas engineering extension division, and representatives of the Crane Company, the Johns-Manville Company, and the Standard Sanitary Mfg. Company.

Offer Technical Courses for Teachers at Carnegie. Six-week courses for teachers and supervisors of manual and industrial arts will be offered at the regular summer session to be held at the Carnegie Institute of Technology, Pittsburgh, Pa. There will be a special preliminary course of two weeks for teachers of certain subjects, and eight-week undergraduate courses for more advanced teachers.

Printers of New York City Request Training Center. The printing industries of New York City have presented a petition to the board of education for an appropriation of $2,500,000 for a building to serve as a training center for the printing industry. Mr. F. A. Silcox, of the advisory committee representing the printers' league section of the New York Employing Printers' Association, has recommended the erection of a building of 200,000 sq. ft. with accommodations for 2,000 printing-trades apprentices.

The committee points out that there are now 1,200 apprentices under instruction in vocational classes maintained directly by the industry or in cooperation with the board of education, and 800 additional apprentices in need of vocational training.

Bibliography of Printing Information. The United Typothetae of America has solicited the aid of the printing teachers of the country in the preparation of a bibliography on printing, which may be used as a working tool for printers and future printers in the industry.

The purpose of the arrangement is to stimulate an interest among printers and future printers in books on printing, to classify these books into suitable units based on price and use, and to promote the sale of the unit libraries to printing establishments, schools of printing, and public and private libraries.

A special committee of six representing the printers of the country, the Typothetae secretaries and managers, the editors of printing journals, teachers of printing, the American Library Association, and the National Association of Book Publishers has been appointed to cooperate with the central committee in classifying the books in salable units.

Conduct First Summer School of Printing at Kansas Teachers College. The first summer school of printing was opened in May, at the Kansas State Teachers College, with Prof. Ralph Coffelt, supervisor of the printing department, in charge. Among the topics discussed were the history of printing, the five methods of printing, the value of printing to the school system, equipment for the school printshop, and bookbinding and leather craft. It is planned to conduct a more extended course next year.

Vocational Training in Alaska. The vocational schools of Alaska are teaching such trades as carpentry, house building, boat-building, furniture construction, operation and repair of gas engines, ivory carving, and basket weaving. The native races of Alaska possess extraordinary dexterity, and with very little training, they excel in all mechanical occupations.

Vocational Conference at Oswego Normal School. Several hundred teachers from various parts of the United States have enrolled in the summer courses at the Oswego Normal School, Oswego, N. Y. A special conference and intensive training course for directors and supervisors of vocational education was arranged for the two-week period from July 16 to 28. The program consisted of three parts: A series of lectures by educational leaders of national importance; round-table discussions of the topics presented by the various speakers, and a thirty-hour course of three hours a day for

(Continued on Page 27a)

(Continued from Page 24a)

ten days, on problems related to the improvement of teachers in service.

Continuation Schools Show Growth. Mr. M. E. Siegel, director of New York evening and continuation schools, in his recent report, calls attention to the rapid growth of the continuation school as an important link in the school system of New York City.

The report shows that in the fifteen continuation schools, 537 teachers are employed to carry forward the training of working boys and girls who have been compelled to leave the full-time schools. In addition, continuation-school work is conducted in some 24 department stores, commercial and industrial organizations. Continuation-school laws are operative in 26 states, the New York law requiring all boys and girls under 17 years of age to attend four hours a week if they have not completed a four-year high-school course.

At present, four central trade-continuation schools are maintained by the city, where related work is provided in conjunction with trade-extension work for those who want it. The general trade-continuation schools, numbering eleven, stress vocational guidance. The aim of the continuation school, according to Mr. Siegel, is "to provide boys and girls with vocational, physical, social, and moral guidance, testing their aptitude, providing information about occupations, helping to secure employment, and furnishing contracts between parents, employers, and young people."

Mr. Denman Kelley, formerly state supervisor of trade and industrial education in Indiana, has been elected principal of the technical high school at Dallas, Tex. Mr. Kelley will take up his new duties on August 1.

Annual Exhibit at Lane Technical High School Held. The Lane Technical High School, Chicago, Ill., held its annual exhibit Tuesday, June 12, 1928, from 1 to 4 and from 7 to 10 p.m. A large number of those interested in the work done at this school visited the exhibit. All of the shop departments were represented and much worth-while work made by the students under the guidance of their able instructors was shown. Exhibits such as this do much in educating the public to the value of trade and industrial-arts work.

Exhibit Held at Shorewood, Wis. At the annual exhibit held at the high school at Shorewood, Wis., the exhibit made by the woodworking department, which included over 220 pieces of furniture, caused a great deal of favorable comment. Mr. Arthur E. Bidney is the instructor in this department.

Boys Construct Problems During Summer-School Session. The boys of the Lew Wallace manual-training shop at Gary, Ind., have made plans for the construction of articles during the summer session. Among the problems, trellises for vines and flowers seem to be the greatest in demand, with flower boxes of many shapes and designs second in demand. Other projects such as screens for windows, gates for back yards, lawn seats, etc., are listed. Toymaking has not been neglected because with the smaller boys it is one of the main features of the summer school.

Manual-Training Equipment Installed. The manual-training department at Norristown, Pa., has installed some new mechanical equipment. The equipment includes a band saw and a planer.

Agricultural Students Win Medals. Eight students of the vocational department of the high school, Neosho, Mo., recently received medals from the Kansas City Star in connection with the state community improvement contest open to agricultural students. There were 3,360 students competing. The Neosho students won two and one-half times as many medals as the average vocational agriculture department in the state.

Teachers of Vocational Agriculture Meet in St. Louis. Forty teachers of vocational agriculture in Missouri met at East St. Louis on June 18 for a three-day session, which included discussions on livestock marketng and tours of the industrial district. The meetings were held under the auspices of the chambers of commerce of St. Louis and East St. Louis.

Dayton Cooperative High School Will Move to New Location. The cooperative high school of Dayton, Ohio, which has been located in the Stivers High School, will move to the Parker school early in 1929. The building is regarded as an ideal location for the cooperative high school because students there are attending on a part-time basis similar to the plan followed at Antioch College and the Cincinnati University.

Boys of St. Louis to be Taught Airplane Building. A feature of the public-school playground program for the summer at St. Louis will be instruction for boys in the building of model airplanes. The summer program work, in addition to other activities, will include a good deal of handcraft.

Training Program for Boys at Akron, Ohio. The board of education of Akron, Ohio, in cooperation with a committee of the Akron General Contractors' Association has completed plans for a training program for boys specializing in construction work in vocational courses.

It is planned to introduce a schedule similar to that prepared for the Automobile Dealers' Association. The schedule will show the length of time the boys will spend in school, the subjects to

(Continued on Page 28a)

Drawing Tables

—for Any School
—for Any Size Class
—for Any Number of Students

For 8 Students
No. 205

Provides individual accommodations for 8 students. Four compartments open to the front and four to the rear, holding drawing boards and other equipment. This desk takes care of the greatest possible number of students in the same room.

For 6 Students
No. 220

One of our best sellers—very roomy and comfortable, with an adjustable top. Very popular for high schools — 6 compartments for 6 students—each containing drawing board, T square, triangles, paper, and instruments.

For 4 Students
No. 240

A good type of Drawing Table for Universities. Provides accommodations for four students, each with individual drawing board compartment and individual drawer for instruments, both locked with same padlock.

The old order is passing—modern schools are becoming equipped with attractive and highly efficient Kewaunee Drawing Tables.

The Kewaunee line comprises Tables designed for two to eight students — all designed for the greatest compactness, comfort, and convenience. They are firmly constructed to insure rigidity for long service under rough student usage. Finished in Light Golden Oak—the standard Kewaunee finish—or we match any special finish desired.

We are manufacturers of a very complete line of Art and Mechanical Drawing Tables. Write for our complete Book of Illustrations.

See our SPECIFICATIONS in BRUCE'S SPECIFICATION ANNUAL INDUSTRIAL ARTS & VOCATIONAL EDUCATION EDITION

Kewaunee Mfg. Co.
LABORATORY FURNITURE EXPERTS

Designers and Manufacturers of Art and Mechanical Drawing Room Furniture for Schools and Colleges

Kewaunee-Economy Plant No. 2
ADRIAN, MICH.

free
this Genuine Irwin Dowel Bit!

So many industrial arts instructors have suggested that we furnish a short bit for the use of younger students, that we have decided to give every authorized industrial arts instructor an opportunity to use an Irwin Dowel Bit 61T, entirely without obligation.

Length — 4½" over all. **Cutting Head** — Smoothbor (see drawing) has these features: (1) Screw with fine pitch of thread for extra smooth boring. (2) Spurs of length in keeping with pitch of screw. (3) Cutters designed for cutting smooth, thin chips. (4) Throat opened for easy flow of chips. **Shank** —Tapered square to fit standard brace chuck. **Finish**—Polished.

Send for your bit now. Let the boys use it constantly and see how well they like it. See how much easier it works in crowded aisleways — and note, too, the absence of bent bit troubles so common in longer bits.

THE IRWIN AUGER BIT COMPANY
Wilmington, Ohio

The IRWIN Bit
REG. U.S. PAT. OFF.

Mail the coupon today. It places you under no obligation whatever.

The Irwin Auger Bit Company,
Wilmington, Ohio.

I am a manual training instructor in..... School. Please send me a genuine Irwin Dowel Bit 61T entirely free of charge.

Name.....

Address.....

City..... **State**.....

(Continued from Page 27a)

be taken, together with plans for reentrance into full-time work upon completion of the course.

Vocational Course at Riverside, Calif. Thirty-six students have enrolled in the vocational-training course at Riverside, Calif. The course, which was arranged by Supt. A. N. Wheelock, includes architectural drawing, preparing specifications, estimating the bill of materials and the cost of construction.

Plan Combination of Continuation and Vocational Schools in New York City. The board of education of New York City has approved a recommendation of the board of superintendents to designate the new Queens Continuation School in Long Island City as a combined continuation and vocational school. Both schools will be conducted under one administration. The building will offer accommodations for 1,115 pupils and will have provision for the teaching of both vocational- and continuation-school subjects.

Farm Boys of Pennsylvania Conduct 2,102 Vocational Projects. The vocational division of the department of public instruction of Pennsylvania reports that farm boys attending the rural community vocational schools of the state conducted a total of 2,102 agricultural home projects last year on which they realized a total income and profit of $181,829.

Poultry projects were the most popular, 590 boys carrying projects of this kind, with a total of 105,867 birds. Potatoes came second with an enrollment of 364 boys growing 376 acres. Truck ranked third, with 345 boys growing 135 acres.

Vocational School at Normandy, Mo. Construction work was started recently on a vocational school, to adjoin the high school at Normandy, Mo.

Begin Movement for Vocational School at Dallas, Tex. The local chamber of commerce at Dallas, Tex., has started a campaign to raise $500,000 for the erection of a vocational school. The school, which was incorporated three years ago, has sponsored a limited program since that time. The activities of the school will correlate with the industries of the city, in that the school will furnish a large part of the supply of trained workers for the trades. The school will offer training in printing, linotype work, lathe operation, machine work, plastering, bricklaying, and other skilled trades.

Vocational Students Build House Near Reed College, Portland, Oreg. Work on the Oregon Building Congress apprentice-built model home at Portland, Oreg., was begun on May 30. The work is being done by apprentices employed in the respective trades who attend school on a part-time basis four hours a week. Mr. L. E. Brigham, director of the vocational department at Portland, is in charge of the work.

The project in home building is being carried out by a number of cooperating groups as follows: Oregon Building Congress, general sponsor; Eastmoreland Company, financing; Oregon chapter, American Institute of Architects, architecture; Associated General Contactors of Portland, construction; building trades council, craftsmanship; department of vocational education, apprentice training.

The work in the apprentice school is composed of eight building trades, with a total registration of 250 for the year. The boys receive from $2 to $9 a day, according to trade experience and ability. In the last two years about twenty have been graduted from the school. Graduate apprentices are regularly accepted by both the employer and labor organizations as full-time journeymen and perform regular journeymen's work at journeymen's wages.

Vocational High School at Pittsburgh, Pa. A vocational high school will be erected at Pittsburgh, Pa., at a cost of $1,500,000. The building will be completed in September, 1929.

Toledo Vocational and Trade-Educational Classes Concentrated in One Building. The old Woodward High School at Toledo, Ohio, has been designated as a center for the vocational, unit trade, and cooperative school activities during the next school year. The building will be provided with a cafeteria and a library and will have over 6,000 lockers for the use of the students.

Will Build Manual-Training Building at Arrogo, Calif. The high-school trustees at Arrogo, Calif., have completed plans for the construction of a shop building on the high-school grounds.

Courses in Printing Taught in 369 Institutions. Courses in printing may be obtained in 369 institutions in the United States and Canada, according to a recent report of the department of education of the United Typothetae of America. During 1926-27, 28,537 students were enrolled in such courses, under the direction of 443 teachers.

Of the institutions in which printing courses are offered, the largest number, 88, are academic high schools; 86 are junior high schools, 22 are technical high schools, and 31 are evening schools. Nine are colleges or normal schools, 10 are "plant" schools, 29 are elementary schools, and 17 are continuation and part-time schools.

The time devoted to the subject varies from 1 to 48 hours per week, and from 5 weeks to 6 years. The ages of the students range from 11 to 16 years in elementary schools, and from 12 to 18, 30, or even 60 years of age in other schools and institutions. The value of the equipment is $3,316,960.

SHELDON BENCHES LEADERS FOR 30 YEARS!

This picture shows graphically Sheldon frame, drawer, top and vise efficiency. It makes apparent the value of the twenty one-half-inch machine bolts and nuts incorporated in Sheldon benches. It shows why vocational supervisors the country over have specified Sheldon Benches for thirty years.

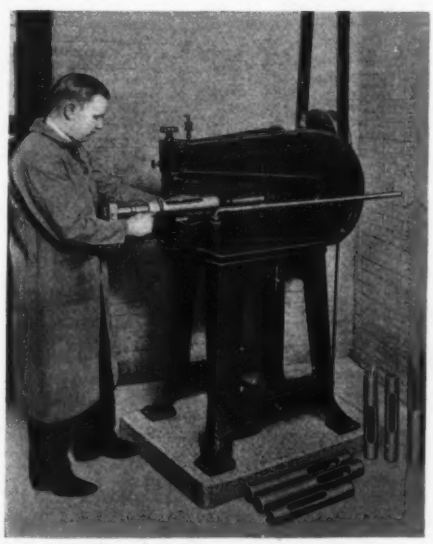
E. H. SHELDON & COMPANY, MUSKEGON, MICHIGAN
VOCATIONAL FURNITURE

SCHOOL SHOP EQUIPMENT NEWS

For the Supervisor and Teacher who desires to keep abreast with news of new Machinery, Tools, Supplies, etc.

ANNOUNCE NEW NIBBLING MACHINE

The American Chain Company, 215 North Michigan Ave., Chicago, Ill., has announced the marketing of a new model I-B nibbling machine for the production of slotted tubes. The machine has a special head, with out-board bracket in front. The effective throat depth is 16 in.



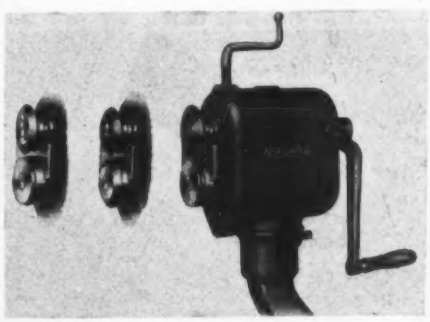
NIBBLING MACHINE.

This machine, it has been found, reduces the operating time for cutting holes in the sides of tubes from 16 minutes to 40 seconds.

The machine contains a mandrel which fits the inside diameter of the tubing to be cut, a template with a quick-acting clamp for attaching to the tube, and an out-board bracket with quick-acting swing clamp for holding the out-board support.

NEW NIAGARA COMBINATION SHEET-METAL MACHINE

The Niagara Machine & Tool Works of Buffalo, N. Y., has placed on the market its No. 147-C Niagara heavy-duty, combination bench machine for turning, wiring, and burring operations in sheet-metal work.



The machine which is arranged with back gearing, will handle up to 18-gauge soft metal and lighter. The particular feature of the machine is its sturdy, one-piece, inclosed frame, which combines safety for the operator with long life in service. The new machine is similar to the No. 131-C bench machine, but is designed to handle the heavier jobs up to 18-gauge metal.

The machine is furnished complete, with one pair of burring faces, one pair of turning faces, one pair of wiring faces, gauge, wrench, and heavy bench stand.

Announcement

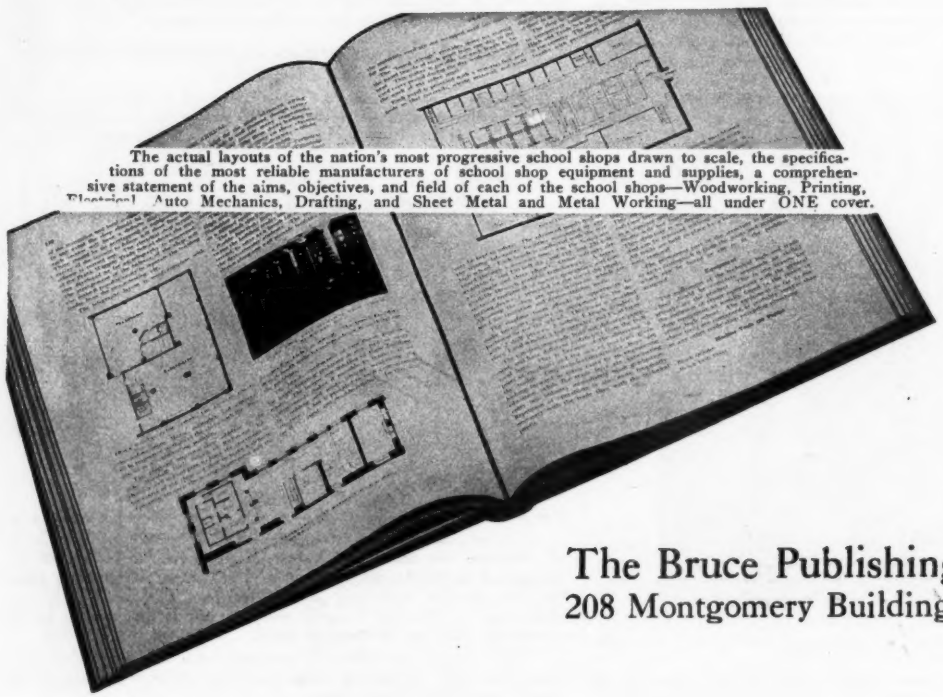
1929 Edition of Bruce's Specification Annual now in preparation

Acceptance has been spontaneous. Within three months BRUCE'S SPECIFICATION ANNUAL has assumed a position of authority and dominance in the school shop field. Long awaited and eagerly acclaimed, this annual source book for all school shop information faces a prosperous and worthwhile future indeed.

It is natural that each succeeding edition of BRUCE'S SPECIFICATION ANNUAL should mark another progressive step and establish new and loftier standards. The 1929 Edition which is now in preparation will contain new features, refinements, and additions which will render it of even greater service to executives and to the schoolman responsible for equipping, conducting, and maintaining the school shop.

The 1929 Edition of BRUCE'S SPECIFICATION ANNUAL will keep pace and faith with the best and most progressive thought on the school shop idea, and each change in form, scope or attitude will be in line with the already established policy of presenting the most advanced and authentic information in the most convenient and serviceable manner. Schoolmen and manufacturers alike will be interested in further announcements which will be made from time to time concerning the progress and development of the second edition of BRUCE'S SPECIFICATION ANNUAL.

This mark identifies progressive manufacturers.



The actual layouts of the nation's most progressive school shops drawn to scale, the specifications of the most reliable manufacturers of school shop equipment and supplies, a comprehensive statement of the aims, objectives, and field of each of the school shops—Woodworking, Printing, Electrical, Auto Mechanics, Drafting, and Sheet Metal and Metal Working—all under ONE cover.

The Bruce Publishing Company
208 Montgomery Building, Milwaukee